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ABSTRACT

This curriculum guide provides descriptions and sequenced topical outlines of courses in natural resources management, giving teachers a logical order for teaching the tasks that students should master to comply with competency-based education requirements in Virginia. The guide is organized in four sections. The introduction provides an overview of natural resources management occupations. Following the introduction is the Guide Application, which divides the occupational domain of natural resources management into programs and courses. This section also contains representative "Dictionary of Occupational Titles" (DOT) job titles that apply to this area. The Secondary Programs and Courses section contains program titles and descriptions, the courses included in each program, the applicable DOT titles, and a description and topical outline for each course. The Postsecondary Programs and Courses section includes the program title and description, as well as information related to program majors and specializations. A listing of Virginia Community College System course numbers and titles for Forestry and Recreational Parks and an outline for the postsecondary course follow. Appendixes list resources for books, teaching materials, audiovisual aids, equipment, and tools. (KC)

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Natural Resources Management

A
CURRICULUM GUIDE
FOR
AGRICULTURAL EDUCATION

Commonwealth of Virginia
Department of Education
Vocational and Adult Education
Richmond, Va. 23216

1985

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NATURAL RESOURCES MANAGEMENT

A
Curriculum Guide
for
Agricultural Education

Prepared by

Virginia Vocational Curriculum Center
Henrico County Public Schools
Department of Vocational
and Community Education
Glen Allen, Virginia 23060

In Cooperation with

Agricultural Education Service
Vocational and Adult Education
Virginia Department of Education
Richmond, Virginia 23216

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Department of Education
Vocational and Adult Education
Richmond, Virginia 23216

1985

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Flora C. Armstrong, Center Director
Elizabeth R. Casey, Writer/Editor
Peggy Lum Watson, Graphics Specialist

Dewey T. Oakley, Jr., Director
Division of Vocational Program Services
Virginia Department of Education

W. Tommy Johnson, Associate Director
Agricultural Education
Virginia Department of Education

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PURPOSE AND ORGANIZATION

Purpose

The purpose of this curriculum guide is to provide descriptions and sequenced topical outlines pertaining to courses in the occupational domain of natural resources management. It provides teachers with a logical order for teaching the tasks that students should master to comply with competency-based education requirements.

This publication is also intended to assist administrators and supervisors in organizing and conducting agricultural education programs which meet the needs of those secondary and postsecondary students who seek vocational training in agricultural resources, supplies and services, and natural resources management.

It is designed to assist guidance counselors by providing summarized information which they can use when exploring with students the possible programs and careers existing in agricultural resources in the area of natural resources management.

Organization

The Introduction provides an overview of natural resources management occupations by giving descriptions and qualifications for many career possibilities in this field. Following the Introduction is the Guide Application, which divides the occupational domain of natural resources management into programs and courses. This section also contains representative Dictionary of Occupational Titles job titles which apply to this domain and are the bases for the tasks/competencies identified in this guide. (A more complete listing may be found in the Dictionary of Occupational Titles, 4th edition, U.S. Department of Labor, 1977.)

The Secondary Programs and Courses section contains program titles and descriptions, the courses included

in each program, the applicable DOT job titles, and a description and topical outline for each course. Information on the natural resources management cluster of the agricultural resources program and its courses appears first in this section.

The Postsecondary Programs and Courses section includes the program title and description, as well as information related to program majors and specializations. A listing of Virginia Community College System course numbers and titles for Forestry and Recreational Parks and an outline for the postsecondary course follow.

Appendix A contains a list of books and selected teaching materials, and Appendix B provides audiovisual materials. A list of publishers' addresses is contained in Appendix C, and information on additional equipment and tools is provided in Appendix D. All are designed to facilitate planning and implementing a competency-based natural resources management program.

INTRODUCTION

Forests, rangelands, soil, and water are important natural resources in the United States. The rangelands and forests, for example, yield raw materials, support livestock, serve as habitats for wildlife, and provide recreation for bikers, campers, and others who enjoy the outdoors. As the population in this country grows, the demands on these natural resources greatly increase. The demands often are conflicting. In some cases, recreational needs conflict with the need to protect fragile areas from overuse. As a result, there is a need for planning the use of natural resources in order to obtain the maximum benefit from them. Workers in the conservation occupations are responsible for protecting, managing, and developing these resources to make them more productive today, and available for future generations.

A common element of conservation jobs is outdoor work. Although much time is spent in natural settings, workers in these occupations are finding it increasingly important to be able to deal with people and to be able to communicate their technical expertise and environmental concern to the various groups of people who use natural resources.

Occupations in natural resources management are varied and numerous; however, this section provides information relating to selected jobs in the field--those that best represent the different types of work available.

Professional and Technical Occupations

Forests are one of this country's most important natural resources, providing among other things, trees for building materials, paper, and fuel. Foresters plan and supervise the growing, protection, and utilization of trees. Some foresters may be responsible for other duties ranging from wildlife protection and watershed management to the development and supervision of camps, parks, and grazing lands. Other workers in this area may do research

or specialize in one area of work, such as timber management, outdoor recreation, or forest economics. A bachelor's degree with a major in forestry is the minimum educational requirement for persons desiring professional careers in forestry.

Forestry technicians, sometimes called forestry aides when working in entry-level positions, assist foresters in the care and management of forest lands and their resources. Technicians work on many forest improvement projects. They inspect trees for disease and work on watershed projects to prevent flood damage and soil erosion. Technicians may work in the area of fire prevention or be involved in maintaining forest areas for hunting, camping, hiking, and other recreational activities. Most persons qualify for entry-level jobs as forest technicians by completing a specialized course of study in a 1- or 2-year postsecondary school or through work experience on firefighting crews, in tree nurseries, or in recreation work.

Range management careers represent another area of job opportunity. Range managers, sometimes called range scientists, range ecologists, or range conservationists, manage, improve, and protect range resources to maximize their use without damaging the environment. Range managers may work to restore and improve rangelands, and office work is not unusual. A bachelor's degree with a major in range management or range science is the usual minimum educational requirement for range managers. A degree in a closely related field may be acceptable for a position in the federal government.

Another very important area of natural resources management is soil conservation. Workers in this occupation provide technical assistance to farmers, ranchers, and others concerned with the conservation of soil and water, and they are involved with developing programs that make the most productive use of land without damaging it. Soil conservationists do most of their work in the field. Very few colleges and universities offer degrees with a major in soil conservation. Most workers,

especially those employed by the Soil Conservation Service, have degrees in agronomy, agricultural education, or general agriculture. A background in agricultural engineering is very helpful to soil conservationists.

Other Jobs in Natural Resources Management

In addition to the many professional and technical jobs that require a knowledge of and training in natural resources management, many industries that rely on natural resources and a supply of raw materials employ persons in occupations that require some training in natural resources management. Businesses also hire and train specialized personnel, depending on the nature of their products, and many industries related to agricultural production require personnel with some training in natural resources management.

The preceding information is extracted from the Occupational Outlook Handbook, 1980-81 edition, U.S Department of Labor, Bureau of Labor Statistics (Bulletin 2075).

GUIDE APPLICATION

This curriculum guide is based on the following representative Dictionary of Occupational Titles (DOT) job titles contained in the occupational domain of NATURAL RESOURCES MANAGEMENT.

DOT Job Title	DOT Code
Soil conservationist	040.061-054
Groundskeeper, parks and recreation	406.687-010
Fish hatchery worker	446.684-010
Christmas tree farm worker	451.687-010
Forester aide	452.364-010
Forest worker	452.687-010
Tree planter	452.687-018
All-round logger	454.684-018
Survey helper	869.567-010

Therefore the guide is useful in developing instructional material and implementing competency-based education for the following programs and courses:

Program	Courses
AGRICULTURAL RESOURCES (CIP Code: 03.0101)	Natural Resources Management III (8040) Natural Resources Management IV (8042) Natural Resources Management V (8044)

Virginia Community College System (VCCS) courses which are related to the occupational domain also are contained in this guide.

Additional information concerning the application and use of this guide in program planning and development should be addressed to:

Agricultural Education Service
Department of Education
P.O. Box 6Q
Richmond, Virginia 23216

SECONDARY PROGRAMS AND COURSES

PROGRAM TITLE: AGRICULTURAL RESOURCES
NATURAL RESOURCES MANAGEMENT CLUSTER

DESCRIPTION:

Natural Resources Management is a (secondary) vocational course which is part of the Agricultural Resources program and involves the production, maintenance, harvesting, processing, and distribution of our natural resources. The course includes resources management, conservation, human relations, and leadership development topics. The study of career opportunities and the development of marketable skills through supervised occupational experiences are also a part of this program.

The primary purposes of the Natural Resources Management course of study are as follows:

A. To provide students job entry and/or marketable skills training in natural resources management and related occupations.
B. To provide for students a broad base of occupational experiences and information upon which they can make a career decision.
C. To contribute to the fulfillment of the broad educational objectives set forth in the high school where this course is taught.

CIP CODE: 03.0101

SUGGESTED GRADE LEVEL: 10, 11, and 12

APPROVED COURSE	VA COURSE CODE
Natural Resources Management III	8040
Natural Resources Management IV	8042
Natural Resources Management V	*8044

REPRESENTATIVE DOT CODE/TITLE (FOR ALL COURSES)

040.061-054	Soil
406.687-010	Groundskeeper, parks and recreation
446.684-010	Fish hatchery worker
451.687-010	Christmas tree farm worker
452.364-010	Forester aide
452.687-010	Forest worker
452.687-018	Tree planter
454.684-018	All-round logger
869.567-010	Survey helper

PROGRAM OPTIONS: Option I: 8040, 8042

Option II: 8040, 8042, 8044

*All Agricultural Education V courses are advanced occupational preparation courses and are optional for completion of the program.

NATURAL RESOURCES MANAGEMENT III (8040)

COURSE DESCRIPTION:

Natural Resources Management III is designed as a one-year, double-period, occupational preparation course offered at the tenth or eleventh grade levels. The course assists students in developing knowledge and skills required for employment in occupations in forestry and wildlife management, outdoor recreation, and air, soil, and water conservation. Because of the emphasis on different facets of natural resources management in different parts of the state, the course will vary to meet local needs and interests. This course includes instruction in forest production and management, wildlife, soil and water conservation, mechanics relating to the field, and leadership training.

PREREQUISITES:

Agricultural Science and Mechanics II

SUGGESTED GRADE LEVEL:

10 or 11

NATURAL RESOURCES MANAGEMENT III (8040)

CONTENT OUTLINE

I. Introducing Natural Resources Management

A. School and department policies
B. Classroom/lab management
C. Safety
D. First aid
E. FFA

II. Choosing and Entering a Career

Identify jobs available in Natural Resources Management

1. Define job title or occupational title
2. Describe the field of Natural Resources Management
3. Locate natural resources management occupational titles in the DOT
4. Write job descriptions for natural resources management occupations
5. Identify natural resources businesses or agencies in the community
6. List occupational titles for natural resources management occupations in the community
7. Classify job titles in each natural resources business or agency
8. Identify educational and experiential requirements

III. Developing Human Relations

Demonstrate skills in communicating with others

1. List the ways humans communicate
2. Define communication
3. Describe the communication model

III. 4. List the causes for breakdown in communication
5. Demonstrate ability to follow oral and written instructions

IV. Managing a Natural Resources Business or Agency

Demonstrate ability to handle a cash transaction

1. Identify the denomination of money
2. Explain the relationship between each denomination of money
3. Compute state sales tax
4. Use basic mathematics to make change
5. Explain how to maintain an accounting system

V. Protecting the Environment

A. Demonstrate knowledge of the environment and its pollution

1. Define terminology
2. Explain importance of photosynthesis and respiration
3. Identify biogeochemical cycles
4. Describe pollution caused by nature and by people
5. List possible solutions to problems
6. Explain conservation techniques
7. Name alternate energy sources
8. Explain need for land-use planning

B. Describe sources of water

1. Identify ground water sources
2. Identify surface water sources
3. Explain or define ground and surface water sources
4. Explain availability of water source
5. Identify future trends
6. Determine feasibility of developing additional water sources

V. C. List the various ways consumers use water

1. List the ways water is used
2. Compare usage lists
3. Explain distinction between consumptive and nonconsumptive uses of water

VI. Planning and Managing Land Usage

Estimate percent of slope

1. Construct and/or secure slope finder
2. Outline procedures for using slope finder
3. Determine percent and direction of slope
4. Explain relationship of slope to land capability classification
5. Define terminology
6. Apply mathematical skills

VII. Managing Fish and Wildlife

A. Determine ration to feed fish

1. Determine balanced fish ration
2. Identify ingredients
3. Explain formulation of feed
4. Identify amount of feed to be fed
5. Determine proper feeding time
6. Determine whether fish are feeding, correct problems
7. Apply mathematical skills

B. Develop a plan to provide food

1. List ways of attracting wild animals/birds to a natural habitat
2. Identify plants or trees that provide cover/food
3. Determine natural food sources
4. List symptoms of wildlife starvation

VII. B. 5. Determine if additional plantings of food sources are necessary
6. Explain process of supplementing food sources

VIII. Managing the Forest

A. Identify tree species

1. Determine the common native trees
2. Locate reference material containing native trees
3. Compare reference material to observe characteristics
4. Demonstrate ability to use a key to identify tree
5. Determine most likely spot to find a particular tree
6. Spell common names correctly

B. Identify and name forest products

1. List the industries that require wood
2. Differentiate forest products
3. Identify common product uses for a particular species

C. Produce Christmas trees

1. Determine characteristics of a desirable site
2. Select suitable varieties
3. Purchase tree stock
4. Plant trees
5. Prune and shape trees
6. Provide adequate protection
7. Harvest, grade, tie trees
8. Arrange for marketing
9. Keep adequate records
10. Define terminology
11. Apply mathmetical skills

IX. Constructing and Maintaining Facilities

A. Demonstrate ability to paint buildings and equipment

1. Prepare surfaces to be painted
2. Mask equipment and building interiors, as needed
3. Prime surfaces as required
4. Select proper paint coating
5. Assemble paint equipment
6. Demonstrate correct operating procedures for hand or power equipment
7. Remove paint from areas not to be covered
8. Clean equipment
9. Store equipment and supplies
10. Define terminology

B. Clean and sanitize buildings

1. Assemble needed cleaning tools and supplies
2. Dust interior of room and furniture
3. Clean walls, partitions, and furniture
4. Sweep room and clean floor

X. Operating Vehicles and Equipment

Demonstrate ability to operate vehicles and equipment

1. Explain general safety rules
2. Demonstrate knowledge of operator's manual
3. Describe starting procedures and operating controls
4. Determine proper and improper functioning
5. Perform necessary adjustments under field conditions
6. Determine capabilities of vehicles and equipment
7. Identify specific safety rules
8. Define terminology

XI. Maintaining Vehicles and Equipment

Demonstrate ability to maintain vehicles and equipment

1. Identify general safety rules
2. Demonstrate knowledge of operator's manual
3. Describe maintenance procedures
4. Secure needed supplies
5. Perform needed maintenance requirements
6. Identify specific safety rules
7. Define terminology
8. Apply mathematical skills

XII. Groundskeeping

A. Water plants

1. Determine amount of water needed
2. Determine soil type and slope for outdoor plants and potting media for indoor plants
3. Check plants
4. Check equipment
5. Set up watering equipment; determine coverage needed
6. Regulate water flow for adequate application
7. Examine plants to determine watering schedule
8. Apply mathematical skills

B. Aerate sod

1. Demonstrate knowledge of operator's manual
2. Determine direction of travel
3. Aerate entire compacted area
4. Clean and repair tires
5. Define terminology

XII. C. Haul and spread topsoil

1. Determine area needing topsoil and required depth
2. Place fill stakes at proper intervals
3. Choose route for hauling
4. Load, transport, dump topsoil
5. Spread topsoil
6. Level topsoil

D. Prepare and apply a compost

1. Prepare a compost using appropriate procedure
2. Apply compost using appropriate procedure
3. Define terminology

E. Sterilize soil

1. Prepare soil for sterilization
2. Identify recommended amount of fumigant or chemical
3. Place warning signs in noticable locations
4. Identify manufacturer's safety procedures
5. Demonstrate ability to use appropriate coverings
6. Explain time restrictions
7. Define terminology

F. Add mulch to new seedlings

1. Prepare soil for mulch
2. Spread mulch
3. Add enough mulch to allow for settling
4. Smooth top of mulch
5. Define terminology

G. Check plants for insects

1. Determine overall appearance of plant-noting abnormalities
2. Describe plant surfaces and ground around plant

XII. G. 3. Identify insect damage
4. Identify insect causing damage
5. Describe beneficial and harmful insects

H. Remove weeds and grasses from flower beds

1. Determine if weeds can be easily removed
2. Demonstrate ability to use hoe or hand-weeder to uproot weeds or grasses
3. Rake weeds or grasses
4. Dispose of weeds or grasses
5. Add new soil or mulch

I. Plant annual flowers

1. Check soil for proper moisture and composition
2. Dig hole
3. Remove plant following proper procedure
4. Pull root ends loose from ball on compacted plants
5. Set plant properly
6. Water plants
7. Provide shade if needed
8. Define terminology

J. Plant flower bulbs

1. Remove bulb from package or storage bed properly
2. Dig hole
3. Place bulb in hole properly
4. Fill in hole
5. Provide adequate moisture

K. Wrap trees or shrubs to protect from weather

1. Determine areas of trees and shrubs vulnerable to winter weather
2. Select a suitable wrapping material
3. Demonstrate knowledge of manufacturer's recommendation in applying material
4. Determine if wrappings are secure

XIII. Implementing Safety Practices

A. Demonstrate safety practices while boating

1. Identify human factors affecting boating safety
2. Identify general safety rules
3. Identify specific safety rules
4. Define terminology
5. Determine adverse weather conditions
6. Describe rescue procedures
7. Demonstrate ability to administer first-aid treatment
8. Explain the importance of swimming ability

B. Demonstrate safety practices while hunting

1. Identify human factors affecting hunter safety
2. Identify general safety rules
3. Identify specific safety rules
4. Define terminology
5. Determine adverse weather conditions
6. Demonstrate ability to administer first-aid treatment

C. Demonstrate safety practices while using tools and equipment

1. Identify human factors affecting tool and equipment safety
2. Identify general safety rules
3. Identify tools and equipment used in student's placement
4. Demonstrate knowledge of information in operator's manual
5. Identify specific safety rules
6. Explain procedures to follow to maintain tools and equipment
7. Define terminology

XIII. D. Identify safe storage methods for chemicals

1. Identify properties of chemicals to be stored
2. Describe properly located storage
3. Describe characteristics of a storage facility
4. Identify warning signs to be posted
5. Describe proper arrangement of chemicals
6. Identify damaged or improper containers
7. List specific safety measures

NATURAL RESOURCES MANAGEMENT IV (8042)

COURSE DESCRIPTION:

Natural Resources Management IV is designed as a one-year, double-period occupational preparation course offered at the eleventh or twelfth grade levels. The course includes instruction in forest protection and harvesting, fish pond ecology and management, the planning and operation of a hunting and fishing preserve, wildlife ecology and management, soil and water management systems, the servicing and operation of large power equipment, and leadership training.

PREREQUISITES:

Natural Resources Management III

SUGGESTED GRADE LEVEL:

11 or 12

NATURAL RESOURCES MANAGEMENT IV (8042)

CONTENT OUTLINE

I. Introducing the Course

- A. School and department policies
- B. Classroom/lab management
- C. Safety review
- D. FFA

II. Choosing and Entering a Career

- A. Describe main occupations
  1. Find reference materials
  2. Locate relevant information
  3. Organize information into written form
  4. Use proper grammar, spelling, and vocabulary
  5. Write legibly
- B. Write a letter of application
  1. List information to be included
  2. Write formal letter of application
  3. Demonstrate knowledge of grammar, spelling, and vocabulary skills
  4. Demonstrate legible handwriting or typing skills
- C. Complete a job application
  1. List information required on job applications
  2. Secure and record personal information
  3. Demonstrate knowledge of grammar, spelling, and vocabulary skills
  4. Demonstrate legible handwriting or typing skills

II. D. Construct a personal data sheet or resume

1. List categories of information to be included
2. Record work/educational experience
3. Identify jobs which coincide with competencies mastered
4. Demonstrate knowledge of grammar, spelling, and vocabulary skills
5. Demonstrate legible handwriting or typing skills

E. Demonstrate personal interviewing skills

1. Explain the purpose and importance of a job interview
2. Describe appropriate dress
3. List materials to take to an interview
4. List frequently asked questions
5. Explain courtesies to exhibit
6. List behaviors that may prevent a job from being offered
7. Describe and practice various interview techniques and procedures

III. Developing Human Relations

A. Evaluate aspects of personal appearance or physical traits

1. Compare the nature of work with physical traits
2. Analyze personal physical traits
3. List physical requirements in natural resources management
4. Explain the importance of maintaining good physical condition

B. Define and identify the importance of etiquette

1. Define etiquette
2. Describe importance of practicing proper etiquette

III. B. 3. Relate importance of etiquette to job security and advancement
4. List and describe socially acceptable forms

IV. Managing a Natural Resources Management Business

A. Demonstrate knowledge of credit and loan application

1. Compile necessary information to obtain a loan
2. Identify necessary forms and documents
3. Determine method and schedule for repayment
4. Define terminology
5. Describe types of financing available
6. List and define three types of loans

B. Set up a partial budget

1. Describe purposes and uses of a partial budget
2. Identify items of income and expense
3. List procedures to prepare a partial budget
4. Prepare partial budget format
5. Apply mathematical skills

C. Identify facility needs

1. Identify purposes(s) of proposed enterprise
2. Determine number of people to be accommodated at one time
3. List individual/group activities
4. Determine public health and safety facility needs
5. Determine refreshment, eating, and amusement needs
6. Determine equipment and maintenance storage needs
7. Determine livestock and wildlife facilities needs
8. Describe the most suitable location
9. Identify a construction schedule
10. Apply mathematical skills

IV. D. Maintain an accurate inventory

1. Explain importance of inventory control
2. Develop materials or equipment identification system
3. Construct an inventory form
4. Describe procedure for conducting inventory
5. Conduct an inventory
6. Maintain proper records of the inventory
7. Define terminology
8. Apply mathematical skills

V. Protecting the Environment

A. Describe interrelation of agriculture and ecosystem

1. Define terminology
2. Identify benefits and losses
3. Explain relationship between modern agricultural practices and wildlife/ plants
4. Describe effects upon water supply

B. Describe interrelation of agriculture and environment

1. Define terminology
2. Identify benefits and losses
3. Describe relationship between agriculture and environment
4. Determine the long-range effects of residues

C. Identify air pollutants and describe their effects on the environment

1. Identify characteristics of unpolluted air
2. Prepare list of air pollutants and their characteristics
3. Identify local sources of air pollutants
4. Identify common air pollutants

V. C. 5. Research effects of air pollutant on the environment
6. Define terminology

D. Select best method to control air pollution

1. List reasons for controlling air pollution
2. Take a sample of air to discover air pollutants
3. Describe several air pollution control methods
4. Identify the laws and regulations enacted to control air pollution
5. Define terminology

E. Identify common vegetation materials used for resource conservation

1. Identify location of a source listing plants commonly used in resource conservation
2. Describe characteristics of vegetative material
3. Identify commonly used vegetative material
4. Identify application situations
5. Define terminology

F. Identify practices to control soil erosion

1. Define soil erosion
2. Describe major factors causing soil erosion
3. List consequences of uncontrolled erosion
4. Describe factors affecting rate of erosion
5. Identify control practices
6. Define terminology
7. Apply mathematical skills

G. Identify and explain methods of water treatment

1. Identify and explain chlorination of water
2. Define terminology
3. Describe effects of storage on water
4. Relate water storage systems to methods of water treatment

H. Identify water pollutants and describe their effect on the environment

1. Identify local sources of water pollution
2. Research effects of a water pollutant on the environment
3. Define terminology

I. Select best method to control water pollution

1. List reasons for controlling water pollution
2. Collect water samples from various sources
3. Explain water pollution control methods
4. Describe laws and regulations enacted to control water pollution
5. Define terminology

VI. Planning and Managing Land Usage

A. Classify land according to capability to produce

1. Define terminology
2. Examine categories of capability classification
3. Determine capability subclasses
4. Examine site and compare characteristics
5. Compare ability of land to produce

B. Prepare seedbeds

1. List characteristics of a good seedbed
2. Determine when soil can be tilled
3. Identify advantages and disadvantages of plowing vs. minimum tillage
4. Identify equipment used in preparing seedbeds
5. Explain relationship of preparation of seedbed to crop planted
6. Define terminology

VI. C. Describe weed control measures

1. Identify methods of weed control
2. Describe how weeds spread
3. Identify equipment used in weed control
4. Describe precautions to be followed
5. Define terminology

D. Outline plans for stockwater ponds

1. Describe characteristics of pond site
2. Determine size of pond required
3. List Soil Conservation Service recommendations
4. Prepare plans and specifications
5. Apply mathematical skills

E. Identify procedures for improving soil

1. Define terminology
2. Apply mathematical skills
3. Provide description of area and soil analysis reports
4. List methods of soil improvement
5. Explain advantages and disadvantages
6. Identify procedures of soil improvement methods

F. Explain the effects of zoning

1. Define terminology
2. Determine differences in laws
3. Explain supervised occupational experience programs
4. Decide whether program is in compliance
5. Determine whether applying for variance justified

G. Demonstrate how to use the pH Test Kit

1. Define terminology
2. Collect soil sample
3. Follow directions in kit

VI. G. 4. Compare color of liquid with color chart
5. Identify the pH value
6. Determine how to raise or lower pH values

VII. Managing Fish and Wildlife

A. Seed, mulch, and fertilize waterholes

1. Apply mathematical skills
2. Locate waterholes suitable for bird habitats
3. Provide suitable feed for the birds by seeding waterholes
4. Apply mulch and fertilizer to the waterholes

B. Identify game, waterfowl, and fish

1. Compile a list of game, waterfowl, and fish species for identification
2. Identify examples of written/ pictorial descriptions of each species
3. List major characteristics of each species
4. Identify characteristics to distinguish species
5. Describe natural habitat characteristics

C. Write plans for establishing a fish pond

1. Describe characteristics of a desirable pond site
2. Determine minimum pond depth
3. Identify soil properties at pond site
4. Explain procedure for contacting resource persons to prepare plans and specifications
5. Describe techniques required to prepare site for pond construction
6. Construct pond
7. Describe method of sealing ponds
8. Explain procedure to establish vegetation to prevent erosion
9. Determine stocking rate of desirable species
10. Identify livesaving equipment
11. Define terminology
12. Apply mathematical skills

VII. D. Develop recommendations for maintaining a pond

1. Perform necessary inspections
2. Keep ground covers in good condition
3. Provide protection to shoreline from wave action
4. Control wildlife and insects at pond site
5. Keep spillways and pipes free from debris
6. Follow recommendations for fertilization and control of algae and weeds
7. Determine availability of desirable species, control undesirable species
8. Determine food availability
9. Evaluate water quality
10. Arrange for sufficient fishing
11. Determine useability of life-saving equipment

E. Write a plan to manage a stream or lake

1. Describe the necessary stream or lake inspections
2. Determine how to establish and maintain ground covers and trees
3. Explain importance of providing protection to shorelines from current and wave action
4. List methods to control animals and insects
5. Provide for litter and debris removal
6. Determine possible public usages and plan appropriate facilities
7. Explain procedures used to evaluate water quality and various other factors
8. Identify recommendations for fertilization and control of algae and weeds
9. Monitor usage by public
10. Define terminology

VIII. Managing the Forest

A. Calculate the volume of pulpwood

1. Define terminology
2. Use tape to determine measurements

VIII. A. 3. Use Biltmore stick
4. Convert measurements
5. Apply mathematical skills

B. Estimate the volume of standing timber

1. Define terminology
2. List tools
3. Describe usage of tools
4. Perform mathematical calculations
5. Explain concept of random and stratified sampling

C. Demonstrate knowledge of tree fertilization

1. Determine need
2. Identify level of nutrients
3. Describe effects of nutrients
4. Identify methods used to time applications
5. Determine amount/method of application
6. Explain cost/benefit factors

IX. Controlling and Preventing Forest Fires

A. Demonstrate knowledge of fire control measures

1. Recite and explain the 10 Standard Fire Fighting Orders
2. Diagram chain of command in a firefighting crew
3. Identify standards for passing physical fitness test
4. Explain procedure to operate hand and/or power tools and equipment
5. List potentially life-threatening/ property-damaging situations
6. Explain fire triangle
7. Define terminology

X. Harvesting Forest Products

A. Locate markets for forest products

1. Identify local markets for logs and pulpwood
2. Determine type of forest product accepted by local markets
3. Determine market demand and impact of new supplier
4. Determine prices paid by markets
5. State special conditions to consider
6. Select most profitable market, defend decision
7. Define terminology
8. Apply mathematical skills

B. Remove debris from work area

1. Clear working space
2. Prepare getaway path
3. Remove any debris interfering with saw cut
4. Clip brush or saplings with axe
5. Devise plan for debris removal
6. Obtain necessary equipment for removal
7. Clean work area of litter
8. Place litter in suitable place for disposal
9. Perform final clean-up

XI. Managing Recreational Enterprises

A. Demonstrate ability to clean and refill pools

1. Drain pool
2. Remove dirt from pool
3. Clean pool surfaces
4. Identify necessary repairs to pool surfaces
5. Paint areas
6. Clean overflow drain
7. Rinse pool surfaces
8. Close drain refilling pool to proper depth
9. Apply proper amount of chlorine
10. Observe safety precautions

XI. B. Develop a plan to establish living fences

1. Determine appropriate plant materials for living fences
2. Determine local bird and wildlife species and coordinate with plant materials
3. Assess proposed planting site to determine if plant material is appropriate
4. Describe procedures to follow to prepare site for planting
5. Identify method of placing plant materials in ground
6. Identify needed care
7. Explain required maintenance

XII. Surveying Land

A. Make linear measurements by pacing

1. Measure 100 feet with tape
2. Pace distance
3. Determine average member of steps required
4. Calculate the total acreage
5. Define terminology
6. Apply mathematical skills

B. Carry and set stakes

1. Demonstrate ability to set stakes
2. Set stakes in horizontal curve situations
3. Set stakes in excavation or fill situations

C. List the uses of surveys

1. Define surveying
2. Differentiate plane and geodetic surveying
3. Describe land or boundary surveys
4. Identify the uses of topographic surveys

XIII. Constructing and Maintaining Facilities

A. Construct fences

1. Determine need for fence
2. List types of fences and uses
3. Calculate number of line posts
4. Select anchor-post assembly
5. Calculate costs of materials
6. List procedures to follow in fence construction

B. Demonstrate ability to repair roads and driveways

1. Locate sunken areas or potholes
2. Remove faulty base material
3. Place a mixture of clay in roadbed following appropriate instruction
4. Follow instructions for placing asphalt, concrete, or gravel
5. Evaluate roadway to determine strength of repair

C. Demonstrate ability to pour and repair concrete

1. Select necessary materials, tools, and equipment
2. Determine usage of concrete
3. Prepare or construct forms
4. Mix materials
5. Spread concrete in form
6. Finish and cure concrete
7. Remove forms and repair
8. Apply mathematical skills

XIV. Operating Vehicles and Equipment

Demonstrate ability to operate vehicles and equipment

1. Explain general safety rules
2. Demonstrate knowledge of operator's manual

XIV.
3. Describe starting procedures and operating controls
4. Determine proper and improper functioning
5. Perform necessary adjustments under field conditions
6. Determine capabilities of vehicles or equipment
7. Identify specific safety rules
8. Define terminology

XV. Maintaining Vehicles and Equipment

Demonstrate ability to maintain vehicles and equipment

1. Identify general safety rules
2. Demonstrate knowledge of operator's manual
3. Describe maintenance procedures
4. Secure needed supplies or parts
5. Perform needed maintenance requirements
6. Identify specific safety rules
7. Define terminology
8. Apply mathematical skills

XVI. Groundskeeping

A. Compile information necessary for purchasing chemicals

1. Describe landscaped area
2. Locate appropriate reference literature
3. Determine specific need for chemicals
4. Identify literature regarding common insects and diseases, recommended chemicals, and application rates
5. List chemical and application rate for a specific usage
6. List chemicals to be purchased
7. Compute costs of chemicals to be purchased
8. Define terminology

XVI. B. Apply chemical treatment to diseased plants

1. Determine proper chemical
2. Explain instructions on container label
3. Identify existing weather conditions to determine if spray can be applied
4. Prepare equipment and chemical mixture
5. Demonstrate application procedures
6. Dispose of chemical container and excess chemical
7. Store chemical safely
8. Clean and store spray equipment
9. Wash exposed skin areas

C. Apply chemical treatment to insect-infested plants

1. Determine proper chemical
2. Explain instructions on container label
3. Identify existing weather conditions to determine if spray can be applied
4. Prepare equipment and chemical mixture
5. Demonstrate application procedures
6. Dispose of chemical container and excess chemical
7. Store chemical safely
8. Clean and store spray equipment
9. Wash exposed skin areas

D. Apply weed-killing compounds to lawn

1. Demonstrate knowledge of safety practices
2. Identify weed(s) present in lawn
3. Determine correct herbicide to purchase
4. Describe proper method(s) of chemical application
5. Determine proper time to apply chemical
6. Explain chemical effects upon weeds and desirable lawn grasses
7. Store excess chemical properly
8. Clean and store spray equipment
9. Define terminology

XVI. E. Prune and trim trees

1. Describe shape
2. Remove suckers and low branches
3. Eliminate competing trunks
4. Determine best branches
5. Eliminate rubbing/inward-growing branches
6. Remove branch, leaving no stem
7. Remove large branches, using safety cut
8. Demonstrate ability to use tree wound paint

XVII. Implementing Safety Practices

A. Develop a list of safety regulations for workers

1. Demonstrate knowledge of the operator's manual concerning specific precautions
2. Determine workers' familarity with equipment operation
3. Write safety language clearly

B. Demonstrate knowledge of administering first aid

1. Identify symptoms of illness
2. Identify supplies in first aid kit
3. Identify common wounds, fractures, and abrasions
4. Identify first, second, and third degree burns
5. List appropriate procedures for treating wounds, fractures, abrasions, and burns
6. Determine the need for CPR
7. List symptons and appropriate treatment for exhaustion, shock, hypothermia, heat stroke, and drug overdose
8. List symptom and treatment for various bites
9. Identify practices of transportation for the injured
10. Define terminology

XVIII. Applying General Knowledge of Natural Resources

A. Define commonly used terms

1. List commonly used terms
2. Locate sources for definition
3. Formulate definition in own words
4. Demonstrate ability to use terms in daily vocabulary

B. Locate and interpret sources of weather information

1. Compile a list of weather information sources
2. List advantages and disadvantages of each
3. Explain function of weather instruments
4. Identify weather conditions by observation
5. Explain symbols used in weather forcasting and maps
6. Describe and relate significance of various cloud formations
7. Define terminology

NATURAL RESOURCES MANAGEMENT V (8044)

COURSE DESCRIPTION:

Natural Resources Management V is a one-year, advanced, optional, occupational preparation course offered at the twelfth grade level. Much of the instruction may be provided through individualized instruction. Major learning areas may include instruction in processing forest products and lumber grading; in determining the feasibility of establishing, financing, and managing a business such as forestry, outdoor recreation, wildlife, and urban conservation. Based upon interests, students may receive instruction in developing and operating campgrounds, hiking and riding trails, riding stables, marinas, vacation farms, and farm ponds. Operation and maintenance of equipment is also emphasized. Leadership training is an important part of instruction.

PREREQUISITES:

NATURAL RESOURCES MANAGEMENT IV

SUGGESTED GRADE LEVEL:

12

NATURAL RESOURCES MANAGEMENT V (8044)

CONTENT OUTLINE

I. Introducing the Course

- A. School and department policies
- B. Classroom/lab management
- C. Safety review
- D. FFA

II. Choosing and Entering a Career

- A. Select a tentative occupation
  1. Evaluate personal career goals
  2. Describe decision-making process
  3. Select a tentative occupation, using decision-making process
- B. Write a follow-up letter of appreciation
  1. List information to be included in follow-up letter
  2. Explain purpose of a formal follow-up letter
  3. Demonstrate knowledge of grammar, spelling, and vocabulary skills
  4. Demonstrate legible handwriting or typing skills
- C. Complete a placement agreement
  1. Review placement form and obtain necessary information
  2. Determine whether employer will aid in completing required competencies
  3. Visit work station and prospective employer
  4. Determine expectations of employer and cooperating teacher

III. Developing Human Relations

A. Exhibit positive human relations traits

1. Define human relations
2. List acceptable human relations techniques
3. Identify relationship between positive human relations and employability
4. Explain importance of positive human relations

B. Identify basic human needs which play a part in worker motivation

1. List basic human needs in order of attainment
2. Define and describe the categories of basic human need
3. Explain the relationship of the attainment of human needs to worker motivation

C. Maintain effective relations

1. Explain importance of developing a positive attitude
2. Define marketable personality
3. Explain importance of having tolerance for others
4. List methods of getting along with others

D. Maintain effective supervisory relations

1. Identify positive work attitudes
2. List positive human relations skills
3. Describe responsibility of supervisor to employee
4. List expectations of supervisor for employee

E. Maintain effective relations with employer/firm

1. Explain the importance of positive work attitudes
2. List four positive human relations skills
3. Explain the role of employer to employee

III. 4. Describe responsibility of worker to supervisor
5. Describe responsibility of worker to employing firm

F. Make a decision, using the decision-making process

1. Gather information on the results of a decision
2. List alternative decisions
3. List advantages and disadvantages of each alternative
4. Make appropriate decision

IV. Managing a Natural Resources Business

A. Demonstrate ability to keep employment records

1. List necessary employment records to keep
2. Explain rules concerning employee records
3. Prepare employees' payroll checks
4. Record and prepare detailed statements for employer, employee and government agencies
5. Define terminology
6. Apply mathematical skills

B. Demonstrate knowledge of employee safety regulations

1. List applicable laws pertaining to employee safety
2. Identify employer's policies pertaining to employee safety
3. Determine case situations where a law applies
4. Explain procedure to inform employees of inappropriate behavior
5. Explain procedure to instruct employees on the correct procedure to follow
6. Observe employees to determine whether safety practices are being followed

IV. C. Determine insurance needs

1. Explain the risk and exposure to liabilities and accidents covered by insurance
2. Determine value of business
3. Evaluate limits of liability needs
4. Identify and compare available insurance rates and coverage
5. Obtain interpretation of insurance coverages
6. Determine adequate coverage to purchase
7. Define terminology
8. Apply mathematical skills

D. Prepare requisitions

1. Determine data needed to prepare requisition
2. Secure additional information to complete requisition
3. Write or type necessary information onto requisition
4. Obtain appropriate signatures
5. File requisition in appropriate location
6. Follow-up requisition if merchandise is not received
7. Define terminology
8. Apply mathematical skills

E. Maintain accurate records

1. Examine reports and determine types of data to be collected
2. Identify schedule for recording data and completing forms
3. Determine need for specific records
4. Fill out forms correctly
5. Demonstrate use of correct grammar, vocabulary, and spelling
6. Apply mathematical skills

IV. F. Maintain field inspection reports

1. Identify field inspection reports to be kept
2. Describe terminology to be included
3. Identify schedule for completing reports
4. Record content accurately
5. Develop and maintain filing system
6. Write legibly or type
7. Demonstrate use of correct grammar, vocabulary, and spelling
8. Apply mathematical skills

G. Write a business letter

1. List components of business letter
2. Explain correct business letter style
3. Identify parts of a letter
4. Describe appropriate message
5. Type letter
6. Define terminology

H. Maintain an organized filing system

1. Identify systems used for filing
2. Select appropriate filing system
3. Maintain up-to-date files
4. Explain required organizational skills

I. Evaluate attitudes regarding change in work routines

1. Explain importance of adaptive behavior
2. Describe situations requiring adaptive behavior
3. Identify methods for dealing with changing job situations
4. Describe methods to facilitate change on the job
5. Explain how an individual's personality impedes change

V. Advertising and Promoting

A. Determine most effective methods of promotion

1. List methods of promoting an enterprise
2. Conduct research on the effectiveness of a promotion method
3. Define terminology

B. Develop a public relations program

1. Identify need for a public relations program
2. Determine available resources that can be committed to the program
3. Identify items to be used in campaign
4. Produce items needed for program
5. Explain how to conduct the public relations program properly
6. Identify methods used to assess effectiveness of public relations program

C. Write newspaper advertisements and articles

1. Select a newspaper with appropriate subscribing audience
2. Identify a needed advertisement or article
3. Prepare for publication
4. Select best location within newspaper
5. Explain how to use a cost-effective amount of space
6. Use correct format for submitting newspaper article
7. Use correct grammar, spelling, and vocabulary
8. Define terminology

D. Prepare an exhibit

1. Prepare schedule of appearances for exhibit
2. Write plans for exhibit transportation, set-up, and maintenance
3. Determine and schedule needed personnel

IV. D. 4. Identify procedure for training personnel to greet public
5. Keep area around the exhibit free of litter

V. E. Present demonstrations

1. Determine content
2. Develop a written outline
3. Assemble needed materials
4. List steps to follow for demonstration
5. Describe how to involve the audience
6. Prepare answers to anticipated questions
7. Determine suitable time limits

VI. Applying Legal Aspects

A. Interpret laws pertaining to wildlife

1. Identify reference materials pertaining to wildlife laws
2. List important factors to consider for case situations
3. Explain law(s) pertaining to cases
4. Describe appropriate action to be taken
5. Define terminology

B. Demonstrate knowledge of various laws

1. Identify laws pertaining to public facilities operation
2. Explain intent of each law
3. Determine compliance or non-compliance with the laws
4. Explain importance of informing facility operators of appropriate laws

C. Demonstrate knowledge of compliance with laws on fishing and boating

1. Secure appropriate current fishing regulations
2. Describe fishing license requirements

VI. C. 3. Explain fishing regulations
4. Identify laws regulating boating
5. Explain laws to individuals and groups

VI. D. Write a sales contract

1. Describe essential elements of a sales contract
2. Identify a format
3. Write sales contract
4. Explain importance of professional assistance
5. Define terminology

E. Describe the work of the Evironmental Protection Agency

1. Identify location of appropriate reference material
2. Determine information to be included in written report
3. Prepare draft of written report
4. Demonstrate ability to use correct grammar, vocabulary, and spelling

VII. Protecting the Environment

A. Make recommendations on good sanitation practices

1. Define terminology
2. Identify location of appropriate reference material
3 Identify situations where sanitation principles are applicable
4. Determine most effective practice for a situation
5. List recommendations for situations

VII. B. Describe agencies responsible for protecting the environment

1. Identify location of appropriate reference material
2. Determine information to be included in report
3. Prepare draft of written report
4. Demonstrate ability to use correct grammar, vocabulary, and spelling

C. Interpret various programs of the soil conservation agencies

1. Explain the purpose of each agency
2. Determine the funding source
3. Identify major programs
4. Relate programs to a farm or business

D. Analyze a sample of water

1. Collect samples of water
2. Outline procedures to follow
3. List bacteria count
4. Determine content of sample
5. Record information

E. Estimate the water needs

1. Identify various uses for water
2 Determine human consumption needs
3. Determine livestock consumption needs
4. Determine lawn, garden, and crop consumption needs
5. Identify needs for a natural resource enterprise
6. Compute total gallons needed for a time period
7. Apply mathematical skills

VIII. Planning and Managing Land Usage

A. Identify alternative land treatment plans

1. Identify soil types
2. Locate soil type
3. Explain restrictions
4. List recommendations

B. Develop farm land-use plans

1. Determine personal and production goals
2. Collect information on usage
3. Examine site
4. Determine agricultural practices
5. Define terminology

C. Interpret land-use maps

1. Define terminology
2. Explain symbols
3. Determine possible uses
4. Justify uses of land

IX. Managing Fish and Wildlife

A. Propagate fish

1. Collect sperm, fertilize eggs
2. Calculate time and frequency of fertilization
3. Identify diseased and unfertilized eggs
4. Determine proper amount of food for fry
5. Check water quality

B. Keep records of fish

1. Keep records of fish
2. Inventory species of fish
3. Determine average yearly growth, record data
4. Apply mathematical skills

IX. B. 5. Keep work diaries and logs
6. Prepare illustrations, tables, and graphs for data

C. Determine proper stocking rate in ponds

1. Calculate surface and running water
2. Explain method of collecting fish for size determination
3. Identify procedures to remove undesirable fish
4. Provide for removal of harvestable fish
5. Apply mathematical skills

D. Identify elements for maintenance of a marsh for wildlife habitat

1. Define terminology
2. Describe existing plant material/ wildlife
3. Determine type of marsh/salt content
4. Identify procedures to secure plant materials
5. Explain methods used to prepare area for seeding/planting

E. Raise game birds

1. Select breeding stock
2. Secure and prepare needed equipment
3. Incubate, hatch eggs; brood chicks
4. Raise birds
5. Trim bills, clip wings
6. Identify and treat diseases
7. Explain methods of controlling predatory animals
8. Prepare for and conduct sale of birds
9. Keep necessary records
10. Define terminology
11. Apply mathematical skills

F. Explain propagation of game animals

1. Select breeding stock
2. Select breeds locally adaptable

IX. F. 3. Identify signs of estrus
4. Describe mating procedures
5. Explain safety precautions for propagation

X. Managing the Forest

A. Identify regeneration techniques necessary for continuous growth

1. List techniques
2. Identify appropriate usage
3. Describe procedures
4. Define terminology

B. Design plans to establish forest roads

1. Determine need for road
2. Determine general location of road
3. Identify actual and visual impact on environment and road structure
4. Describe a possible road layout
5. Conduct preliminary survey, mark road
6. Explain method used to clear merchantable trees
7. Explain importance of providing drainage and slope stabilization
8. Describe how to maintain roads
9. Identify procedure to prepare needed skid roads
10. Locate landings to accommodate equipment
11. Explain methods to control erosion
12. Define terminology
13. Apply mathematical skills

C. Develop a forest management plan

1. Identify a major forest type in region
2. Determine objectives of forest owner
3. Analyze current forest stand
4. Explain the need for intermediate and harvest cuts
5. Identify practices to assure optimal growth

X. C. 6. Determine how to secure cost-efficient machinery, equipment, and tools
7. Explain procedure to prepare land for reforestation
8. Define terminology
9. Apply mathematical skills

D. Plan a timber stand improvement project

1. Define timber stand improvement (TSI) and related terminology
2. Explain method used to prepare forest site for planting
3. Identify procedures used to seed site
4. Identify procedures used to thin and prune site
5. Describe various terms of TSI
6. Apply mathematical skills

E. Manage a forest harvesting plot

1. Select trees for harvest
2. Demonstrate ability to use roads to good advantage
3. Supervise felling of trees
4. Supervise limbing and bucking of trees
5. Supervise handling and skidding of trees
6. Supervise loading of logs
7. Supervise hauling of logs
8. Enforce safety regulations
9. Define terminology
10. Apply mathematical skills
11. Maintain necessary records

XI. Controlling and Preventing Forest Fires

A. Describe fire location, using appropriate terminology

1. Describe features, symbols on a contour map
2. Explain forest fire location system

XI. A. 3. Define measurement units
4. Determine how to read and follow a compass
5. Identify north, east, west, and south
6. Define terminology
7. Apply mathematical skills

B. Write a control program for a fire

1. Describe main parts of a fire environment and interaction
2. List and describe characteristics of fire behavior
3. Describe fire management decisions, relate to fire control plan
4. List methods of fire control
5. Explain calculations used to determine fire's potential behavior
6. Define terminology
7. Apply mathematical skills

C. Conduct safety training exercises and demonstrate being responsible for others in fire control

1. Recite and explain the 10 Standard Fire Fighting Orders
2. Describe necessary precautions
3. Identify fire characteristics leading to fatality
4. Explain importance of effective communication
5. Demonstrate ability to use firefighting tools and equipment properly
6. Outline series of safety lessons
7. Define terminology

D. Prepare publicity on fire prevention

1. Describe forest fire and burning laws
2. Illustrate fire prevention methods
3. Describe Forest Service symbols used in publicity

XI. D. 4. Select appropriate format for publicity release
5. Explain restrictions in using "Smokey the Bear"

XII. Harvesting Forest Products

A. Select timber for purchase

1. Locate forest inventory information for locality
2. Explain procedure to follow in examining timber stands
3. Determine fair market value for owners of tracts
4. Identify special problems for each tract
5. Define terminology
6. Apply mathematical skills

B. Plan logging activities

1. Explain procedure to follow in examining timber site to determine size and location of harvesting tract
2. Develop time schedule for harvesting
3. Outline logging activities
4. Project required cash flows
5. Devise alternative schedules to determine impact upon performance or profit
6. Define terminology
7. Apply mathematical skills

C. Analyze the purchase of equipment

1. Determine job demands for specific equipment
2. Compute ownership and operations costs
3. Identify advantages/disadvantages of purchase
4. Examine purchase impact on cash flow
5. Explain how to locate equipment dealers
6. Determine parts availability

XII. C. 7. Determine best financing option
8. Explain process of ordering equipment
9. Determine arrangements for payment
10. Apply mathematical skills

D. Outline the procedure for supervising the loading of logs

1. Explain importance of having a clear work area
2. List process used to inspect loading equipment prior to loading
3. Identify procedure to follow for loading
4. Explain procedure used to determine if load is balanced
5. Describe how to attach chains and load binders correctly
6. Determine legal load limits and route to be followed
7. Describe process of estimating weight of vehicle
8. Explain OSHA standards

E. Outline the procedure for supervising the unloading of logs

1. Explain necessity of posting signs
2. Describe process used to release, remove, and store load binders
3. List uses of loader to stabilize load before tripping stakes
4. Identify reasons for tripping stakes
5. Explain how to unload vehicle
6. Explain use of hand signals
7. Explain how to reset stakes, move truck, clear debris
8. Identify current OSHA standards

F. Develop a plan to deliver forest products to manufacturing sites

1. Determine delivery route and a delivery schedule
2. Identify how to examine load to determine compliance with regulations

XII. F. 3. Explain how to reexamine load and vehicle
4. Identify how to operate vehicle safely, efficiently
5. Explain scaling process
6. Identify process followed after unloading, prepare vehicle for return trip

G. Demonstrate ability to fell trees, using chain saw

1. Determine where tree should be dropped
2. Examine site carefully
3. Describe the location of skid trails and an escape route
4. Determine direction for tree to be felled from or toward the skid trail
5. Demonstrate ability to make undercut
6. Demonstrate ability to make backcut
7. Use wedges as needed
8. Use techniques necessary for leaning, rotten, or lodged trees
9. Follow OSHA standards
10. Define terminology

H. Demonstrate ability to limb and top felled trees

1. Remove limbs
2. Cut away from self on opposite side of stem
3. Make cut flush with stem
4. Top tree
5. Describe mechanical devices used for limbing softwoods
6. Follow state laws or landowner's directions for limb disposal
7. Follow safe procedure for removing limbs under stress
8. Define terminology

I. Make bucking cuts

1. Explain relationship of bucking procedure to products to be delivered, their value, and purchaser specification
2. Size tree stem and mark suitable bucking cuts

XII. I. 3. Demonstrate ability to use procedures to obtain maximum volume
4. Make bucking cuts in safe manner
5. Follow OSHA standards
6. Define terminology
7. Apply mathematical skills

XIII. Managing Recreational Enterprises

A. Inspect recreational areas

1. Determine proper condition
2. Describe orally whether tree meets standards
3. Identify action to be taken in cases of non-compliance
4. Arrange for work necessary to return area to proper condition

B. Describe procedures involved in hunting/fishing expedition

1. Organize hunting/fishing parties
2. Select geographical location
3. Estimate needs and secure supplies
4. Map and plan routes
5. Obtain required licenses
6. Plan daily schedules
7. Plan arrangements
8. Determine per person charges

C. Direct and lead activities

1. Analyze abilities and needs of individuals
2. Select appropriate activities
3. Secure supplies and materials
4. Provide directions and motivation
5. Evaluate the success

D. Advise on navigational methods

1. Describe boat registration procedures
2. List safety equipment

XIII. D. 3. Describe rules of the road
4. Identify unlawful acts
5. Describe waterway markers
6. Define terminology

E. Develop rules for campgrounds

1. Identify situations requiring written rules
2. Determine rules used
3. Explain the need for a rule
4. Compose rules

F. Order weekly campground supplies

1. Order parts for campground equipment
2. Determine appropriate order for food supplies
3. Order medical supplies
4. Identify consumable supplies
5. Apply mathematical skills

G. Locate trails

1. Examine site to discover scenery and grades involved
2. Determine characteristics of self-guiding trail
3. Mark and clear trails
4. Provide adequate bridging
5. Develop rest areas
6. Establish and maintain safety hazard warning signs
7. Plan for adequate training
8. Determine liability risks
9. Apply mathematical skills

H. Plan sled and snowmobile areas

1. Identify possible sites
2. Examine method to clear and mark trails and paths

XIII. H. 3. Provide rest stations
4. Develop equipment rental plan
5. Describe a plan for equipment maintenance and repair
6. Identify a plan to provide for safety and patrolling
7. Apply mathematical skills

I. Select method to control insects in camping areas

1. Identify major insect infestations
2. Determine methods of control
3. List advantages/disadvantages of methods
4. Prepare pesticides
5. Determine effectiveness
6. Apply mathematical skills

XIV. Surveying Land

A. Set up and operate surveying instruments

1. List/describe parts of the level
2. Demonstrate ability to set up tripod
3. Remove level from case
4. Remove dust cap
5. Adjust instrument to level
6. Focus level crosshairs
7. Demonstrate ability to view rod
8. Define terminology
9. Apply mathematical skills

B. Adjust and clean surveying instruments

1. Identify adjustments made to instruments
2. Determine materials used
3. Outline procedure for cleaning instruments

C. Identify and correct malfunctions of surveying equipment

1. List possible malfunctions
2. Identify common malfunctions

XIV. C. 3. Determine procedures for correcting
4. Determine situations requiring assistance

D. Locate and stake a terrace line

1. Explain plan
2. Assemble materials needed
3. Stake terrace line
4. Compare staked line

E. Determine field area

1. Identify boundaries
2. Determine shapes and distances
3. Secure formulas for calculations
4. Define terminology
5. Apply mathematical skills

XV. Constructing and Maintaining Facilities

A. Demonstrate ability to build a masonry retaining wall

1. Lay out footing
2. Dig footer trench
3. Set stakes to show concrete depth
4. Pour concrete
5. Assemble tools, equipment, and supplies
6. Mix mortar
7. Apply mortar to blocks
8. Set block in place
9. Smooth mortar joints
10. Clean and store tools, equipment, and supplies
11. Clean wall
12. Define terminology
13. Apply mathematical skills

B. Build a stone wall

1. Lay out footing
2. Dig footer trench
3. Set stakes

XV. B. 4. Pour concrete
5. Assemble tools, equipment, and supplies
6. Mix mortar
7. Apply mortar to stones and joints
8. Set stones
9. Smooth mortar joints
10. Clean and store tools, equipment, and supplies
11. Clean stones
12. Define terminology
13. Apply mathematical skills

C. Demonstrate knowledge and ability in performing subjourney-level skills in carpentry

1. Identify simple hand and power tools
2. Describe function of tools
3. Demonstrate ability to perform basic skills
4. Demonstrate knowledge of performing more advanced skills

D. Demonstrate knowledge and ability in performing subjourney-level skills in electricity

1. Identify hand and power tools
2. Describe function of tools
3. Demonstrate ability to perform basic skills
4. Demonstrate knowledge of performing more advanced skills

E. Demonstrate knowledge and ability in performing subjourney-level skills in plumbing

1. Identify hand and power tools
2. Describe function of tools
3. Demonstrate ability to perform basic skills
4. Demonstrate knowledge of performing more advanced skills

XVI. Operating Vehicles and Equipment

Demonstrate ability to operate vehicles and equipment

1. Explain general safety rules
2. Demonstrate knowledge of operator's manual
3. Describe starting procedures and operating controls
4. Determine proper and improper functioning
5. Perform necessary adjustments under field conditions
6. Determine capabilities of vehicles and equipment
7. Identify specific safety rules
8. Define terminology

XVII. Maintaining Vehicles and Equipment

A. Demonstrate ability to maintain vehicles and equipment

1. Explain general safety rules
2. Demonstrate knowledge of operator's manual
3. Describe starting procedures and operating controls
4. Determine proper and improper functioning
5. Perform necessary adjustments under field conditions
6. Determine capabilities of vehicles and equipment
7. Identify specific safety rules
8. Define terminology

B. Service various types of equipment drives

1. Identify basic types of belts, chains, gears, and their application in equipment drives
2. Inspect components of equipment drives
3. Clean components of equipment drives
4. Lubricate equipment drives
5. Adjust belts, chains, gears, sprockets

XVII. B. 6. Examine equipment to determine if safety shields are in place
7. Define terminology
8. Apply mathematical skills

C. Attach accessory equipment

1. Determine hook-up sequence by reading operator's manual
2. Describe general and specific safety precautions
3. Perform necessary physical operations
4. Determine if equipment is properly attached
5. Determine whether accessory equipment remains properly attached
6. Define terminology

XVIII. Groundskeeping

Develop fertilization schedules

1. Examine description of landscape area
2. Examine results of soil testing
3. List each type of shrub, flower, tree, and lawn area
4. Identify publications
5. List fertilizer types, application rates, application methods
6. Determine approximate dates for application
7. Keep records
8. Apply mathematical skills

XIX. Securing Natural Areas

Demonstrate ability to patrol assigned area

1. Determine schedule for patrolling
2. Explain to visitors rules and regulations
3. Identify ways to enforce rules and regulations

XIX.
4. Outline types of duties
5. Identify situations requiring action or assistance

XX. Applying General Knowledge of Natural Resources

A. Identify and list natural resources of a site

1. Compile a checklist of natural resources
2. Identify each of the natural resources in a natural state
3. Identify each natural resource found on site
4. Demonstrate ability to classify resources

B. Identify, by common and scientific name, common Virginia grasses and plants

1. Compile a list of common Virginia grasses and plants
2. Secure drawings of grasses and plants
3. Secure and preserve samples
4. Identify each plant and grass by common and scientific name

POSTSECONDARY PROGRAMS AND COURSES

PROGRAM TITLE: Agricultural and Natural Resources Technology

DESCRIPTION:

This program is one of six within the Virginia Community College System that lead to an Associate in Applied Science Degree, a degree covering all programs in Occupational-Technical Education.

Each degree program includes several majors, some of which are further divided into appropriate specializations. This breakdown is shown for the Agricultural and Natural Resources Technology degree program.

Degree

Majors

Specialization

Agricultural and Natural Resources Technology

- Agricultural Business
- Agronomy
- Animal Science
  - Animal Husbandry
  - Animal Technology
- Forestry
  - Forest Products Producer
- Horticulture
- Livestock
- Natural Resources Management and Security
- Wildlife

Many of the specialized courses, including Agricultural Business, Agricultural Production, and Horticulture, offered within the community college system are suitable for persons in Natural Resources Management. A complete listing of these courses appears in the Virginia Community College System State Curriculum Guide. Included here is the listing for the Forestry and Recreation and Parks options.

A suggested task/competency listing for postsecondary courses is contained on the following pages along with the content outline. A particular postsecondary course may contain some elements of this outline; however, a person would have to choose many courses in order to complete the suggested outline.

FORESTRY

VCCS COURSE NUMBER	VCCS COURSE TITLE
FORE 100	Introduction to Forestry
106	Forest and Wildlife Ecology
107	Range Management
110	Introduction to Forest and Wildlife Mgt.
117	Dendrology
118	Applied Silviculture
121	Forest Fire Control
122	Forest Protection
130	Forest and Wildlife Recreation Mgt.
131	Wildlife and Fisheries Mgt.
132	Forest Recreation
141	Wildlife Management Practices I
142	Wildlife Management Practices II
143	Wildlife Management Practices III
150	Introduction to Urban Forestry

VCCS COURSE NUMBER	VCCS COURSE TITLE
FORE 187	Forest Practicum
201	Forest Mensuration I
202	Forest Mensuration II
203	Tree, Log, and Lumber Grading
204	Wildlife Investigational Techniques I
205	Wildlife Investigational Techniques II
206	Wildlife Management Techniques
207	Aerial Photo Interpretation
215	Habitat Management
216	Managing the Backyard Wildlife Habitat
217	Plant Identification
220	Wildlife Ecology
227	Game Fish Ecology
230	Forest Management
231	Woodlot Management
240	Habitat and Food Plant Identification
241	Forest Products I
247	Timber Harvesting
250	Heavy Equipment Operation and Maintenance
252	Cost Control in the Logging Industry
256	Basic Sawmilling
258	Contracts and Cost for Logging

RECREATION AND PARKS

RCPK 100	Introduction to the Recreation and Parks Field
101	Recreation and Parks Mgmt. I

VCCS COURSE NUMBER	VCCS COURSE TITLE
RCPK 102	Recreation and Parks Mgmt. II
103	Recreation and Parks Mgmt. III
106	Team Sports in Recreation
107	Individual Sports in Recreation
108	Recreation for Special Groups
109	Playground Leadership
110	Recreational Applied Arts Mgmt.
111	Recreation Intramurals I
112	Recreation Intramurals II
113	Recreation Intramurals III
116	Social Recreation Leadership
117	Social Recreation
118	Recreational Arts and Crafts
120	History and Introduction to Recreation
126	Natural Resources and the Urban Enrvironment
127	Park Planning
136	Program Planning, Organization, and Group Leadership
137	Organization and Management of Recreational Sports Activities
138	Fundamentals of Camp Management and Operation
139	Marine Recreation
146	Community and Family Recreation
150	Survey of Private, Commercial, and Industrial Recreation

VCCS COURSE NUMBER	VCCS COURSE TITLE
RCPK 160	The Arts in Recreation
206	Outdoor Recreation
207	Recreational Drama
208	Recreational Dance
220	Fundamentals of Interpretive Services
224	Natural and Historical Interpretation in the Urban Environment I
225	Natural and Historical Interpretaton in the Urban Environment II

POSTSECONDARY

CONTENT OUTLINE

I. Managing a Natural Resources Business

A. Prepare a complete budget

1. Identify items of income and expense
2. Explain purpose and uses of a budget
3. List procedures for budget preparation
4. Prepare a budget format
5. Define terminology
6. Apply mathematical skills

B. Interpret a financial statement

1. Describe a financial statement
2. Identify the purpose of a financial statement
3. Explain the various components to statement
4. Define terminology
5. Explain the relationship of recordkeeping and accounting to a statement
6. Apply mathematical skills

C. Apply the principles of double-entry bookkeeping

1. Demonstrate ability to add, subtract, multiply, divide whole numbers with decimals
2. Define terminology
3. Explain principles of double-entry bookkeeping
4. Write figures neatly, legibly

D. Determine personnel requirements

1. Identify mission statement and determine its impact upon hiring practices
2. Identify need for specialized personnel

I. D. 3. List duties of persons to be employed
4. Develop personnel plan
5. Write appropriate job descriptions

E. Interview and select employees

1. Determine the amount of labor needed
2. Assess degree of competency required
3. Review applications
4. Interview prospective employees
5. Complete paperwork to hire employee
6. Demonstrate ability to inform other applicants of decision

F. Demonstrate training techniques

1. Determine worker's background and experience
2. Select task for which skill is lacking
3. Demonstrate task
4. Evaluate worker's performance
5. Determine if re-training is necessary
6. Repeat procedure for remainder of tasks

G. Supervise subordinate workers

1. Explain the importance of developing positive work attitudes
2. Identify components of positive interpersonal skills
3. Describe responsibility of supervisor to employee
4. List expectations of supervisor for employee

H. Evaluate employee's performance

1. Describe role of supervisor in employee performance evaluation
2. Analyze employee's performance according to evaluation form
3. Complete the evaluation form accurately

I. I. Develop work methods and procedures

1. Identify task to be performed
2. List methods to be followed in completing the task
3. Explain methods
4. Identify the importance of revising methods as necessary

J. Lay out a weekly schedule of activities for an employee

1. Identify component parts/tasks of a job
2. Organize tasks
3. Estimate time required
4. Identify amount of time for completion of task
5. Complete written form listing employee activities

K. Explain working conditions under existing contract agreements

1. Describe provisions of employee's contract
2. Identify working conditions covered by contract
3. Determine whether working conditions are compatible with contract
4. Explain procedure if working conditions and contracts not in compliance
5. Explain need for flexibility within contract

II. Advertising and Promoting the Natural Resources Enterprise

A. Demonstrate knowledge of broadcast promotions

1. Select a radio or television station with appropriate audience
2. Plan needed radio or television program
3. Determine best times of broadcast

II. A. 4. Determine necessary materials for broadcast
5. Explain how to use time effectively
6. Demonstrate ability to use correct grammar, spelling, and vocabulary
7. Define terminology

B. Assist in conducting tours

1. Describe functions of a tour guide
2. Identify the criteria for conducting successful tours and the importance of each
3. Explain importance of speaking ability and vocabulary

C. Address audience interested in natural resources

1. Select suitable topic
2. Analyze audience
3. Determine presentation content
4. Prepare outline of presentation
5 Practice presentation
6. Present speech
7. Use appropriate grammar and vocabulary

III. Applying Legal Aspects

A. Demonstrate a knowledge of laws related to environmental protection

1. Identify major legislative acts related to environmental protection
2. Describe the intent of each act
3. List punitive action that may be taken against violators
4. Define terminology

B. Interpret appropriate laws

1. Identify location of appropriate reference materials
2. Explain applicability of law

III. B. 3. Describe various laws
4. Define terminology

C. Interpret OSHA implications

1. Secure a current copy of OSHA regulations
2. Determine regulations applying to a natural resources enterprise
3. Identify acceptable and unacceptable situations
4. Make a list of recommendations to upgrade unacceptable situations
5. Define terminology

D. Identify laws regulating public access

1. Identify location of appropriate reference materials
2. Describe the intent of each law
3. Define terminology

E. Outline procedure for obtaining leases with landowners for land open to public activities

1. Identify reasons why landowner would allow public access
2. Distribute game commission signs and posters
3. Explain procedures to advise landowners on planting and maintaining game habitats
4. Obtain copies of a suitable lease
5. Secure leases with individual landowners
6. Define terminology

IV. Protecting the Environment

A. Describe methods of dealing with conservation problems, planning, and practices

1. Identify conservation problems
2. Describe problem
3. Determine plan(s) to correct problem

IV. A. 4. Explain necessary conservation practices to deal with problem
5. Estimate costs involved
6. Define terminology

B. Collect necessary samples for EPA inspections

1. Locate references related to sample collection
2. Identify equipment needed
3. Outline procedures to be followed
4. Prepare written documents

C. Participate in investgative activities

1. Determine agency policies
2. Explain legal requirements to be followed
3. Identify data to be collected and an appropriate recording form
4. Describe potentially hazardous situations

D. Operate and maintain the Dissolved Oxygen Meter and Sampler

1. Secure owner's manual for equipment
2. Outline operating procedures
3. Explain maintenance procedures
4. Identify malfunctions in equipment
5. Define terminology

E. Monitor potential pollutors

1. Describe agency's policies about monitoring
2. Explain harassment as applied to monitoring
3. Plan schedule for systematic observation of potential pollutors
4. Maintain accurate records
5. Explain monitoring results to supervisors

F. Demonstrate ability to advise public on pollution problems

1. Research current information on a particular problem

IV. F. 2. Demonstrate ability to prepare article
3. Demonstrate ability to use correct grammar, vocabulary, and spelling

G. Diagram a sewage disposal system

1. Define terminology
2. Examine local, state, and federal regulations
3. List symbols used to describe components
4. Compute size of disposal system requirements
5. Draw the sewage disposal system to scale
6. Define terminology

V. Planning and Managing Land Usage

Formulate the agricultural land-use section of a comprehensive plan for community development

1. Determine components of land-use section of plan
2. Collect information and data for section of plan
3. Determine format for reporting information
4. Describe procedure for holding public hearings
5. Prepare draft of agricultural land-use section

VI. Managing Fish and Wildlife

A. Operate a game animal checking station during hunting seasons

1. Determine the requirements for operating a game animal checking station
2. Describe game laws in specific terms
3. Examine game at checking station
4. Record required information
5. Report unusual circumstances to proper authority
6. Keep records accurate and up-to-date

VI. B. Measure wildlife population

1. List methods for measuring wildlife population
2. List advantages and disadvantages of each
3. Select method(s) appropriate for counting species
4. Define terminology
5. Apply mathematical skills

C. Demonstrate ability to manage wildlife

1. Inventory available feed
2. Determine balance of animals to food supply
3. Determine physical condition of wildlife
4. Evaluate wildlife habitat
5. Recommend stocking procedures
6. Apply mathematical skills

D. Report on the control of diseases and parasites in game animals

1. List diseases and parasites
2. Describe symptons
3. Identify control measures
4. Devise preventive measures

E. Describe establishment of a wildlife preserves area

1. Define terms
2. Determine need
3. Explain procedure to inspect site
4. Describe ways to identify boundaries
5. Develop a plan for security
6. Explain duties of manager

F. Develop recommendations to conduct a wildlife control program

1. Determine need/practicality of wildlife programs
2. List damaged caused by wildlife

VI. F. 3. Determine if problem is short or long term
4. Relate legal status of animal
5. Identify control measure
6. Keep records

G. Supervise operation of equipment and facilities for plant life projects

1. Make necessary recommendations
2. Provide technical assistance in tree/shrub planting
3. Supervise preparation of seed beds
4. Identify particular habitats of local fauna
5. Plant or maintain food/cover for particular species

VII. Controlling and Preventing Forest Fires

A. Lay out a plan to mop up a fire

1. Determine fire location and area to be mopped up
2. Assess needed resources
3. Identify available resources
4. Set a schedule and procedure for crews
5. Explain need for revegetation/reforestation
6. Apply mathematical skills

B. Complete the Forest Service fire report

1. List primary causes of a fire
2. List legal restriction applying to investigating forest service officer
3. Identify accepted fire investigating procedure
4. Complete a fire report form
5. Define terminology

VIII. Harvesting Forest Products

Outline procedures for managing harvesting operations

1. Identify type of cutting

VIII.
2. Prepare listing of equipment and time table
3. Determine felling patterns
4. Identify elements required to supervise work crews
5. Prepare records
6. Define terminology
7. Apply mathematical skills

IX. Sawing Logs into Lumber

A. Demonstrate sawmill safety, including first-aid-treatment

1. Protect eyes and ears
2. Describe safe handling
3. Dress in suitable clothing
4. Wear safety equipment
5. Remove dangerous materials
6. Perform first aid
7. Give signals for vacating area

B. Demonstrate ability to perform general operation activities

1. Check sources of power
2. Identify methods for maintaining working condition of machinery
3. Identify methods for maintaining working condition of power system
4. Explain the function of all mobile equipment
5. Identify the location of fire extinguishers
6. Identify the location of fire hoses
7. Check fire extinguishers

C. Demonstrate ability to operate carriage

1. Demonstrate knowledge of distance and space
2. Ride short distances forward and backward
3. Check rollers and coasters

IX. C. 4. Check bearings and fittings
5. Check feeding system
6. Conduct safety check of work area

D. Grade a stack of lumber

1. Identify hardwood/softwood
2. Apply grading rules
3. Grade softwood
4. Identify method of evaluating boards
5. Define terminology

E. Demonstrate ability to operate circular saw

1. Check teeth for sharpness
2. Inspect work area safety
3. Demonstrate knowledge of pulley operation
4. Examine belts for operation
5. Check electrical system
6. Maintain flow of logs
7. Explain process of feeding logs into saw
8. Check for foreign material in work area
9. Determine time needed to change saw blade
10. Sharpen saw teeth
11. Adjust saw

X. Managing Recreational Enterprises

A. Design recreational enterprise

1. Determine major types of recreational enterprises
2. Sketch a rough drawing of design
3. Determine management needs
4. Identify the capital needs
5. Estimate attendance and gross receipts
6. Identify labor needs
7. Estimate operating costs
8. Estimate overhead costs of maintenance
9. Prepare an income and expense budget
10. Apply mathematical skills

X. B. Identify and plan needed financial backing for recreational enterprise

1. Determine amount of capital to be borrowed
2. Develop a cash-flow projection
3. Determine loan repayment schedule
4. Identify sources of financial backing available to individuals
5. Describe sources of financial backing available to municipal governments

C. Assist in the formulation and development of interpretive program services

1. Identify characteristics of individuals, families, tours, and organized clubs
2. Determine orientation needs
3. List goals, objectives, etc.
4. Plan for campfire programs, guided walks, etc.
5. Identify ways of getting participants involved
6. Demonstrate ability to use interpretive aids

D. Plan security programs for recreational enterprises

1. List secruity measures
2. Identify budget constraints
3. Describe applicability of each security measure and compute cost

E. Design special features

1. Assess land area and topographical needs
2. Determine if safety factors can be incorporated
3. Identify number of people to be accommodated
4. Develop list of equipment, supplies, materials
5. Sketch design of area
6. Apply mathematical skills

XI. Surveying Land

A. Measure and record distances, run compass lines, and identify topographic features

1. Measure and record distances
2. Explain how to run compass line
3. Relate topographic symbols
4. Define terminology

B. Complete a surveying job

1. Assemble all required tools and materials
2. Determine personnel needs
3. Set up equipment and record measurements
4. Identify sources/types of errors
5. Recheck readings and recordings
6. Apply mathematical skills
7. Define terminology

C. Demonstrate ability to use hand level or engineering level and tape

1. Determine operating procedures by reading owner's manuals
2. Identify correct operating procedures
3. Apply mathematical skills

D. Write legal descriptions of a selected plot of land

1. Identify principles of writing legal descriptions
2. List the parts of a description
3. Write description using procedure in reference manual
4. Define terminology

E. Convert English measurement units to metric equivalents, and metric equivalents to English units

1. Determine how to read chart correctly
2. Apply mathematical skills
3. Define terminology

XI. F. Perform land line location and corner restoration work

1. Secure written documents and maps
2. Run lines and corners
3. Establish lines and corners
4. Define terminology
5. Apply mathematical skills

XII. Constructing and Maintaining Facilities

Maintain and operate water treatment plants, wells, swimming pools, and chlorine systems

1. Complete all forms and reports
2. Inspect equipment, tools, etc.
3. Perform cleaning operations
4. Demonstrate service and maintenance function
5. Conduct chemical tests

XIII. Operating Vehicles and Equipment

Demonstrate ability to operate vehicles and equipment

1. Explain general safety rules
2. Demonstrate knowledge of operator's manual
3. Describe starting procedures and operating controls
4. Determine proper and improper functioning
5. Perform necessary adjustments under field conditions
6. Determine capabilities of vehicles and equipment
7. Define terminology

XIV. Maintaining Vehicles and Equipment

Demonstrate ability to maintain vehicles and equipment

1. Identify general safety rules

XIV.
2. Demonstrate knowledge of operator's manual
3. Describe maintenance procedures
4. Secure needed supplies and parts
5. Perform needed maintenance requirements
6. Identify specific safety rules
7. Define terminology
8. Apply mathematical skills

XV. Implementing Safety Practices

Explain method of investigating accidents

1. Identify accidents requiring further investigation
2. Describe rules of an agency for investigating accidents
3. Explain legal aspects
4. Demonstrate ability to complete agency reporting forms
5. Maintain appropriate records

XVI. Securing Natural Areas

A. Demonstrate ability to apprehend violators and take appropriate action

1. Determine which law was violated
2. Describe the procedures to follow
3. Identify situations requiring additional help
4. Demonstrate ability to complete necessary paperwork

B. Explain procedure for preparing cases for prosecution

1. Identify evidence to obtain for legal action
2. Describe process of obtaining/serving warrants
3. Explain importance of consulting a legal opinion

XVI. C. Interpret fish and game laws

1. Explain fish and game laws to individuals and groups
2. Identify applicable law in case study
3. Paraphrase an appropriate course of action for enforcement
4. Define terminology

APPENDICES

APPENDIX A: Books and Selected Teaching Materials

APPENDIX B: Audiovisual Materials

APPENDIX C: Publishers' Addresses

APPENDIX D: Additional Equipment and Tools

APPENDIX A

BOOKS AND SELECTED TEACHING MATERIALS

The collection and utilization of instructional resources such as reference books, films, slides, and transparencies are valuable sources of information for the teacher and curriculum developer. These materials are useful in developing instructional materials and providing instructional activities.

This section includes a listing of reference books and audiovisual materials which have been identified by teachers as useful in developing competency-based instructional course material.

BOOKS

Amberson, Max L., and Anderson, B. Harold. Learning Through Experience in Agricultural Industry. New York: Gregg/McGraw-Hill, 1978.

Anderson, David A., and Holland, I.I. Forests and Forestry, 3rd Edition. Danville, Illinois: Interstate Printers and Publishers, Inc., 1982.

Bosworth, Duane A., and Foster, Albert B. Approved Practices in Soil Conservation, 5th Edition. Danville, Illinois: Interstate Printers and Publishers, Inc., 1982.

Christiansen, Monty L. Park Planning Handbook. New York: John Wiley and Sons, Inc., 1977.

Conservation Farming. Moline, Illinois: Deere & Company, 1980.

Daniel, Theodore W.; Helms, John A.; and Baker, Frederick S. Principles of Silviculture, 2nd Edition. New York: McGraw-Hill, 1979.

Dent, D. Douglas. Professional Timber Felling: A Procedural Approach. Portland, Oregon: Ryder Printing Co., 1974.

Donahue, Roy L.; Follet, Roy H.; and Tulloch, Rodney W. Our Soils and Their Management, 4th Edition. Danville, Illinois: Interstate Printers and Publishers, Inc., 1976.

Elman, Robert. The Hunter's Field Guide to the Game Birds and Animals of North America. New York: Alfred A. Knopf, 1974.

Forest Farmers Association. Forest Farmer: Manual Edition. Atlanta, Georgia. (Magazine).

Giles, Robert H., Jr. Wildlife Management. San Francisco: W. H. Freeman and Company, 1978.

Group Instruction Handbook--Cooperative Part-Time Training. College Station, Texas: Vocational Instructional Services, Texas A & M University, 1975.

Hammond, James J.; Donnelley, Edward T.; Harrod, Walter F.; and Rayner, Norman A. Woodworking Technology. Bloomington, Illinois: McKnight Publishing Company, 1980.

Hillison, John, and Crunkilton, John R. Human Relations in Agribusiness. New York: Gregg/McGraw-Hill, 1980.

Kircher, H. B., and Wallace, Donald L. Our Natural Resources, 5th Edition. Danville, Illinois: Interstate Printers and Publishers, Inc., 1982.

Lee, Jasper S. Commercial Catfish Farming, 2nd Edition. Danville, Illinois: Interstate Printers and Publishers, Inc., 1981.

Lee Jasper S. Working in Agricultural Industry. New York: Gregg/McGraw-Hill, 1978.

McClane, Albert Jules. McClane's Field Guide to Freshwater Fishes of North America. New York: Holt, Rinehart and Winston, 1978.

Migel, J. Michael. The Stream Conservation Handbook. New York: Crown Publishers, Inc., 1974.

Nourse, Alan E. The Outdoorsman's Medical Guide. New York: Harper and Row, Publishers, Inc., 1974.

Pritchett, William L. Properties and Management of Forest Soils. New York: John Wiley and Sons, 1979.

Skinner, Rulon D. Basic Canoeing Techniques. Provo, Utah: Brigham Young University Publications, 1975.

Stoddard, Charles H. Essentials of Forestry Practice, 3rd Edition. New York: John Wiley and Sons, 1978.

Trees. New York: Time-Life Books.

U.S. Department of Agriculture. Forest Service. Forest Product Laboratory. Wood Handbook: Wood as an Engineering Material. Agriculture Handbook No. 72. Washington, D.C.: Government Printing Office, 1974.

U.S. Department of Agriculture. Outdoors, USA, The Yearbook of Agriculture. Washington, D.C.: Government Printing Office, 1967.

U.S. Department of the Interior. Conservation Yearbook Series (Various Titles). Washington, D.C.: Government Printing Office.

U.S. Department of Labor. Bureau of Labor Statistics. Occupational Outlook Handbook. Bulletin 2075. Washington, D.C.: Government Printing Office, 1980.

U.S. Department of Labor. Employment and Training Administration. Dictionary of Occupational Titles. Washington, D.C.: Government Printing Office, 1977.

Weyant, J. Thomas, et al. An Introduction to Agricultural Business and Industry. Danville, Illinois: The Interstate Printers and Publishers, Inc., 1971.

The Wildlife Society. Wildlife Management Techniques Manual, 4th Edition. Washington, D.C.: The Wildlife Society, 1980.

Working. Richmond, Virginia: Virginia Department of Education, Division of Vocational Education, 1981.

You're Hired--Getting the Right Job for You. Austin, Texas: The University of Texas at Austin, Instructional Materials Services, 1973.

TEACHING MATERIALS

Advertising the Promotion of Agricultural Products. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, 1976.

Agricultural Surveying. Urbana, Illinois: Vocational Agriculture Service.

The Air Pollution Inspector. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, 1974.

Applying for a Job. Urbana, Illinois: Vocational Agriculture Service.

Applying Pesticides. Athens, Georgia: American Association for Vocational Instructional Materials.

Building Fences. Athens, Georgia: American Association for Vocational Instructional Materials, 1974.

Choosing Your Work. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, 1977.

Concrete Improvements for Farm and Home. Urbana, Illinois: Vocational Agriculture Service.

Controlling Tree and Shrub Insects. Urbana, Illinois: Vocational Agriculture Service.

Controlling Weeds. Urbana, Illinois: Vocational Agriculture Service.

Fertilizing and Watering Shade and Ornamental Trees. Urbana, Illinois: Vocational Agriculture Service.

Determining Probable Soil Losses in Conservation Farming. Urbana, Illinois: Vocational Agriculture Service.

Fire Behavior. Boise, Idaho: Boise Interagency Fire Center, 1981.

Titles:	Fire Behavior Field Guide
	Student Guide and Text
Unit I	The Fire Environment
II	Fuels Classification
III	Topography and Fire Behavior
IV	Temperature-Moisture Relationship
V	Fuel Moisture
VI	Local and General Winds
VII	Atmospheric Stability and Instability
VIII	Keeping Current With the Weather
IX	Extreme Fire Behavior
X	Fire Behavior Affects Fireline Tactics
XI	Fire Behavior Predictions

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Getting Hired for Your First Job. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, 1977.

The Greenhouse Worker. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, 1981.

Groundskeeping Equipment. Athens, Georgia: American Association for Vocational Instructional Materials, 1974.

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Growing Flowering Annuals. Urbana, Illinois: Vocational Agriculture Service.

Guide to Conservation Careers. League City, Texas: National Association of Conservation Districts, 1981.

How to Make a Good Ad Better. New York, New York: Newspaper Advertising Bureau, Inc.

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The Illustrated Tool Identification Manual. San Luis Obispo, California: Vocational Education Productions.

The Insect Identification Manual. San Luis Obispo, California: Vocational Education Productions.

Introduction to Fire Behavior S-190, Student Workbook and Instructor's Guide. National Wildlife Coordinating Group. Boise, Idaho: Boise Interagency Fire Center, 1976.

Job Application and Job Interviews. Richmond, Virginia: Virginia Department of Education, Public Information and Publications Office.

Locating Your Job. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, 1977.

Maintaining the Lighting and Wiring System. Athens, Georgia: American Association for Vocational Instructional Materials, 1980.

Migratory Game Bird Regulations. Richmond, Virginia: Virginia Commission of Game and Inland Fisheries (current year).

Migratory Waterfowl Regulations. Richmond, Virginia: Virginia Commission of Game and Inland Fisheries (current year).

Motorboat Owner's Guide. Richmond, Virginia: Virginia Commission of Game and Inland Fisheries (current year).

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pH Test for Soil Acidity. Urbana, Illinois: Vocational Agriculture Service.

Planning Fences. Athens, Georgia: American Association for Vocational Instructional Materials, 1980.

Planning for an Individual Water System. Athens, Georgia: American Association for Vocational Instructional Materials, 1982.

Planting and Care of Farm Forests. Urbana, Illinois: Vocational Agriculture Service.

Pruning Shade Trees. Urbana, Illinois: Vocational Agriculture Service.

Recommended Practices for Building with Concrete Masonry. Urbana, Illinois: Vocational Agriculture Service.

Resource Conservation Glossary, 3rd Edition. Ankeny, Iowa: Soil Conservation Society of America, 1981.

Safe Tractor Operation and Daily Care. Athens, Georgia: American Association for Vocational Instructional Materials.

Safety and Health Modules. Arlington, Virginia: American Vocational Association.

Safety in the Agricultural Mechanics Shop. Urbana, Illinois: Vocational Agriculture Service.

Selling and Salesmanship for Agricultural Products. Columbus, Ohio: Ohio Agricultural Education Curriculum Materials Service, 1976.

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U.S. Department of Agriculture. Forest Service. An Assessment of the Forest and Range Land Situation in the United States. FS-345. Washington, D.C.: Government Printing Office, 1980.

U.S. Department of Agriculture. Forest Service. Build Recreation Structures from Low-Grade Hardwoods. General Technical Report NC-14. St. Paul, Minnesota, 1975.

U.S. Department of Agriculture. Forest Service. Chain Saw Training Guide. Washington, D.C.: Government Printing Office, 1978.

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U.S. Department of Agriculture. Forest Service. Determining Fixed and Operating Costs of Logging Equipment. General Technical Report NC-55. Washington, D.C.: Government Printing Office, 1980.

U.S. Department of Agriculture. Forest Service. Equipment Development Center. Trail Deterioration and Maintenance. Washington, D.C.: Government Printing Office, 1980.

U.S. Department of Agriculture. Forest Service. Fire-Weather Observer's Handbook. Agriculture Handbook No. 494. Washington, D.C.: Government Printing Office, 1976.

U.S. Department of Agriculture. Forest Service. Fitness and Work Capacity. FS-315. Washington, D.C.: Government Printing Office, 1977.

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U.S. Department of Agriculture. Forest Service. Forests for Our Needs: 1979 Research Accomplishments. General Technical Report WO-23. Washington, D.C.: Government Printing Office, 1980.

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U.S. Department of Agriculture. Forest Service. Forest Management Practices to Prevent Insect and Disease Damage to Southern Pine. SA-FR9. Atlanta, Georgia: Southeastern Area, State and Private Forestry, 1981.

U.S. Department of Agriculture. Forest Service. A Forester's Guide to Observing Wildlife Use of Forest Habitat in the South. SA-FR15 Atlanta, Georgia: Southeastern Area, State and Private Industry, 1981.

U.S. Department of Agriculture. Forest Service. Growing Christmas Trees in the South. General Report SA-FR5. Atlanta, Georgia: Southeastern Area, State and Private Forestry, 1980.

U.S. Department of Agriculture. Forest Service. Hardwood Log Grades and Lumber Yields for Factory Lumber Yards. Forest Service Research Paper NE-468. Washington, D.C.: Government Printing Office, 1980.

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U.S. Department of Agriculture. Forest Service. Preparing Directories to Local Outdoor Recreation Facilities. Forest Service Technical Report NE-46. Broomall, Pennsylvania, 1978.

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U.S. Department of Agriculture. Forest Service. Silvicultural Systems for the Major Forest Types of the United States. Agriculture Handbook No. 445. Washington, D.C.: Government Printing Office, 1979.

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U.S. Department of Agriculture. Soil Conservation Service. Plant Materials for Conservation. Program Aid No. 1219. Washington, D.C.: Government Printing Office, 1979.

U.S. Department of Labor, Occupational Safety and Health Administration. All About OSHA. Washington, D.C.: Government Printing Office, 1980.

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Virginia's Fishing Regulations. Richmond, Virginia: Virginia Commission of Game and Inland Fisheries (current year).

Wildlife Mangement: Agricultural Education in Virginia Secondary Schools. Seattle, Washington: Outdoor Empire Publishing, Inc., 1977. Available from Virginia Commission of Game and Inland Fisheries.

APPENDIX B

AUDIOVISUAL MATERIALS

I. American Association for Vocational Instructional Materials, 120 Driftmier Engineering Center, Athens, Georgia 30602.

Slides or Filmstrips

A. Applying Pesticides

B. Developing Shop Safety Skills

C. Electrical Wiring

D. Understanding Electricity and Electrical Terms

II. Boise Interagency Fire Center, Division of Training, 3905 Vista Avenue, Boise, Idaho 82705.

A. Introduction to Fire Behavior

B. Atmospheric Stability and Instability

C. Man Against Fire

D. Crew Boss

E. Fire Weather

F. Water on the Fire

G. Handtools for Wildfire

H. Standards for Survival

I. Your Way Out

III. Career Aids, Inc., 8950 Lurline Avenue, Dept. K 456, Chatsworth, California 91311.

Filmstrips with Casettes

A. Getting a Job Series

1. Preparing for a Job
2. The Help-Wanted Ads
3. Applying for a Job
4. The Job Application Form
5. The Job Interview

B. Me and Jobs Series

1. What Do I Have That a Job Needs?
2. The Job Environment and Me
3. Want Ads
4. Application Forms
5. Job Interview Skills

C. Oral Communication Series

1. Talking and Listening
2. Listen and Learn
3. Talk Better and Get Ahead

D. Job Attitudes and Habits Series

1. A New World: The Job World
2. You and Your Job Attitudes
3. You and Your Job Habits
4. You and Your Bosses
5. You and Your Co-Workers

IV. Commission of Game and Inland Fisheries, 4010 W. Broad Street, Richmond, Virginia 23230.

Films

A. Before You Hunt

B. Do It Right

IV. C. Prescription for Boating Safety and Pleasure

D. Whitewater Primer

V. Fearon Pitman Publishers, Inc., 6 Davis Drive, Belmont, California 94002.

Simulated cash register drawer

The CA$HBOX

VI. Gregg/McGraw-Hill, Princeton Road, Highstown, New Jersey 08520.

Game

Paying Your Way

VII. Ohio Agricultural Education Curriculum Materials Service, Room 254, 2140 Fyffe Road, The Ohio State University, Columbus, Ohio 43210-1099.

Slides with script

A. Annuals

B. Concrete Masonry

Slides

A. Lawn Renovation and Reestablishment

B. Mr. Quality Concrete

C. Timber Cruising

D. Tree Identification

VIII. Virginia Department of Agriculture and Consumer Services, P.O. Box 1163, 1100 Bank Street, Washington Building, Capital Square, Richmond, Virginia 23209.

Filmstrip

Agricultural Career Opportunities

IX. Virginia Department of Education, Division of Vocational Education, Agricultural Education Service, P.O. Box 6Q, Richmond, Virginia 23216.

Filmstrip

Virginia's Forests--Careers in Forestry

X. Vocational Agriculture Service, University of Illinois, 434 Mumford Hall, Urbana, Illinois 61801

Slidefilms

A. Agriculture and Ecosystem

B. Agriculture and the Environment

C. Air Pollution Damage to Vegetation

D. Applying for a Job

E. Calibrating and Applying Pesticides Safely

F. Erosion, Sedimentation, and Environmental Quality

G. Lawn Weeds--Identification and Control

H. Pruning Deciduous Shrubs

I. Pruning Evergreens

J. Pruning Flowering Trees

K. Recording Field Notes for Surveying

X. L. Selecting and Handling Pesticides

M. Using the Level in Farm Surveying

N. Using the Steel Tape in Surveying

O. Vegetation Control as an Aid to Environmental Quality

P. Weed Identification

XI. Vocational Education Productions, California State Polytechnic College, San Luis Obispo, California 93407.

Filmstrips (most with Cassettes)

A. Agricultural Credit

B. Careers in Agriculture Series

1. Agricultural Production
2. Agricultural Products
3. Agriculture Resources
4. Environmental Protection
5. Equipment and Mechanics
6. Forestry
7. Ornamental Horticulture
8. Supplies and Services

C. The Chain Saw and Other Harvesting Tools

D. Ecology and Agriculture Kit

1. Ecology and the Agricultural Environment
2. Soil and the Agricultural Environment
3. Water and the Agricultural Environment
4. Air and the Agricultural Environment
5. People and the Agricultural Environment

XI. E. Fish Farming in the '80s Series

1. Modern Fish Farms
2. Fish Health Management

F. Game Bird Management Kit

1. An Introduction to Game Birds
2. Brooding

G. Hand Tools of the Fire Control Forester

H. Managing Wildlife: Is It For You?

I. Oxy-Acetylene Welding Kit

1. Oxy-Acetylene Welding: Setting Up the Equipment
2. Oxy-Acetylene Welding: Flat Position Welds

J. Resource Law Enforcement

K. School Shop Safety

APPENDIX C

PUBLISHERS' ADDRESSES

Agricultural Education Program
Virginia Polytechnic Institute
and State University
Blacksburg, Virginia 24061

Allyn and Bacon, Inc.
470 Atlantic Avenue
Boston, Massachussetts 02210

American Association for Vocational
Instructional Materials
120 Engineering Center
Athens, Georgia 30602

The Associated Press and
Prentice-Hall Media
Tarrytown, New York 10591

Boise Interagency Fire Center
Attention: Administrator
Division of Training
3905 Vista Avenue
Boise, Idaho 83705

Career Aids, Inc.
8950 Lurline Avenue
Department V12
Chatsworth, California 91311

Doane Agricultural Service, Inc.
8900 Manchester Road
St. Louis, Missouri 63144

Forest Farmer Association
P.O. Box 95385
4 Executive Park East, NE
Atlanta, GA 30347

Forest Products Laboratory
Forest Service
U.S. Department of Agriculture
P.O. Box 5130
Madison, WI 53705

Gregg/McGraw-Hill
Princeton Road
Hightstown, New Jersey 08520

IAVIM Center
208 Davidson Hall
Iowa State University
Ames, Iowa 50011

Industrial Commission of Virginia
P.O. Box 1794
Richmond, Virginia 23714

Institute of Labor Relations
University of California
Berkeley, California 94700

Center for Occupational
Curriculum Development
P.O. Box 7218
The University of Texas at Austin
Austin, Texas 78712

Chicago Mercantile Exchange
444 West Jackson Boulevard
Chicago, Illinois 60606

Cooperative Extension Service
Virginia Polytechnic Institute
and State University
Blacksburg, Virginia 24061

Delmar Publishers
50 Wolf Road
Albany, New York 12205

Instructional Materials Center
(see Center for Occupational
Curriculum Development)

Instructional Materials Laboratory
10 Industrial Education Building
University of Missouri-Columbia
Columbia, Missouri 65211

The Interstate Printers
and Publishers, Inc.
19-27 North Jackson Street
Danville, Illinois 61832

John Deere Service Publications
Department F
John Deere Road
Moline, Illinois 61265

Department of Labor and Industry
P.O. Box 12064
Richmond, Virginia 23241

John Wiley & Sons, Inc.
One Wiley Drive
Somerset, New Jersey 08873

Library Filmstrip Center
3033 Aloma
Wichita, Kansas 67211

MacMillan Publishing Company, Inc.
866 3rd Avenue
New York, New York 10017

Modern Talking Picture Service
5000 Park Street North
St. Petersburg, Florida 33709

National Association of
Conservation Districts
408 East Main Street, Box 855
League City, Texas 77573

National Audubon Society
Nature Center Planning Division
1130 Fifth Avenue
New York, New York 10028

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Tennessee Valley Authority
Office of Public Information
400 Commerce Avenue
Knoxville, Tennessee 37902

U.S. Department of Labor
Bureau of Labor Statistics
Information Office--Room 1539
441 G Street, N.W.
Washington, D.C. 20212

U.S. Department of Labor
Employment and Training Administration
Room 10225
601 D Street, N.W.
Washington, D.C. 20213

U.S. Department of Labor
Wage and Hour and Public
Contracts Division
Washington, D.C. 22004

Newspaper Advertising Bureau, Inc.
485 Lexington Avenue
New York, New York 10017

Ohio Agricultural Education Curriculum
Materials Service
Room 254, 2120 Fyffe Road
The Ohio State University
Columbus, Ohio 43210

Prentice-Hall, Inc.
Box 500
Englewood Cliffs, New Jersey 07632

Prentice-Hall Media
150 White Plains Road
Tarrytown, New York 10591

U.S. General Services Administration
National Audiovisual Center
Washington, D.C. 20409

Venard Films, Ltd.
Box 1332
Peoria, Illinois 61654

Virginia Department of Agriculture
and Consumer Services
203 North Governor Street
Richmond, Virginia 23209

Virginia Department of Education
P.O. Box 6Q
Richmond, Virginia 23216

Vocational Agriculture Service
College of Agriculture
University of Illinois
434 Mumford Hall
Urbana, Illinois 61801

Reston Publishing Company, Inc.
11480 Sunset Hills Road
Reston, Virginia 22090

Soil Conservation Society of America
7515 Northeast Ankeny Road
Ankeny, Iowa 50021

Vocational Education Productions
California State Polytechnic College
San Luis Obispo, California 93401

Vocational Instructional Service
Texas A & M University
College Station, Texas 77843

APPENDIX D

ADDITIONAL EQUIPMENT AND TOOLS

Service: Agricultural Education

Program: Natural Resources Management

(The following list of equipment and tools is in addition to that needed for teaching Agricultural Production. Refer to National Resources Management Curriculum Guide for Agricultural Education, 1972, for recommended quantity and specifications.)

I. Essential items of equipment, tools/apparatus/supplies, and education media for program approval.

A. Equipment

Bars, planting
Binoculars
Blower, power mist
Borer, increment and case
Brooders
Clinometer with case
Gun, tree marking
Hand shears
Harvesting equipment
Incubator
Injector, tree
Level, abney with case
Level and stachia rod
Maps
Mattock
Planting bar pruners
Prism, cruising
Reel and chain tape
Small engine tool set
Saw, chain
Saw, crosscut
Saw, pole

I. A. Equipment (continued)

Saw, pruning
Saw, saber
Seeder, cyclone
Shovel
Sieve
Tree caliper

B. Tools/Apparatus/Supplies

Aerator
Air compressor
Auger, soil
Axe, bush
Axe, single bit
Axe, double bit
Back pack pump
Bag, planting
Bows and arrows
Brushhook
Building, storage (small aluminum siding building)
Calculator
Camera
Chisels
Cleaning tools
Compass, hand
Compass, surveying & staff
Compost bin
Concrete supplies/tools
Ear muffs, safety
Electric drill
Electrical fixtures
Equipment drives and supplies
Fertilizer
Files and rasps
Files, chainsaw
Fill materials
Fir brook
First aid kit
Fish eggs
Flagging, plastic

I. B. Tools/Apparatus/Supplies (continued)

Flashlight
Gauge, bark
Gauge, basal area angle
Goggles
Grids, acreage
Growing mediums
Grinder
Guards, shin
Hammer, increment and case
Hand lens
Hand level (abney)
Hard hat
Helmets, head caps
Herbicide application equipment
Hoe
Hook, cant
Increment borer
Irrigation equipment
Inventory-taking equipment
Kit, snake bite
Kit, soil test
Lawn rollers
Level
Lumber for grading
Magnifier, pocket
Masonry tools/supplies
Meter, talley
Microscope
Mirror, hand
Mounts for plant samples
Mower, reel & rotary
Mulch
Paddles, tree marking
Paint, tree marking
Painting supplies and tools
Peavy (solid socket)
Photographs, aerial (obtain locally)
Planting supplies/tools
Plants

I. B. Tools/Apparatus/Supplies (continued)

Plaster of paris
Play money
Pliers
Plumbing supplies/tools
Powder, tree marking
Pruning equipment
Pulaski
Rake
Rule, lumber
Ruler
Safety equipment
Safety signs
Samples of polluted air & water
Sampling net (or tea strainer)
Sandpaper
Sawmill carriage
Scale, tree and log
Screwdriver
Seeds
Soil Conservation Service recommendations
Soil preparation equipment
Soil samples
Specimens
Steel toe boots
Stereoscope, pocket model
Stick, biltmore
Tally boards
Tally sheets
Tamper
Tape recorder
Tape, tree diameter
Tape, two chain
Telephone
Telephone directories
Torch
Tree marker, chalk
Typewriter
Video-tape player/recorders
Weatherstation equipment
Wedges

I. B. Tools/Apparatus/Supplies (continued)

Wheelbarrow
Wirenuts
Wrenches

C. Educational Media

Bulletin boards
Case studies
Charts
Checklists
Copies of inventories
Displays
Field inspection report forms
Films
Filmstrips
Financial statements
Grading rules
Income tax guides
Manuals
Maps
Models
Newspapers
OSHA regulations
Payroll forms and literature
Periodicals
Reference books (maximum 5 copies each)
Sample budgets
Sample employee contracts
Slide sets
Transparency sets

Good judgment should be used in making available a variety of up-to-date audiovisual materials in a quantity sufficient for the teacher to provide for individual needs in a competency-based system.

One copy of the Natural Resources Management Curriculum Guide distributed by the Agricultural Education Service must be available to each teacher. Reference books or manuals pertaining to instruction in Natural Resources Management must be available.

II. Supplementary basic items of equipment, tool/ apparatus/supplies, and education media eligible for reimbursement.

(Same as Agricultural Production)

Service: Agricultural Education

Programs: Exploratory Agriculture
Agricultural Science & Mechanics
Agricultural Production

(For recommended quantity and specifications, refer to Tool and Equipment List for Exploratory Agriculture and Agricultural Science and Mechanics, 1978 and Inventory of Tools and Equipment for a Department of Agricultural Education.)

I. Essential items of equipment, tools/apparatus/supplies, and education media for program approval.

A. Equipment

Air compressor
Anvil w/ stand
Bars, pry and wrecking, set
Bits, drill, sets
Box, mitre
Brace & bit set
Chisels, cold set
Chisels, wood set
Clamps "C" set
Cold metal hand tool sets
Cutters, bolt, pipe, glass
Drawing kit
Drills presses, wood & metal
Drills, hand electric
Extinguishers, fire
Electrical teaching cabinet
Electrical kits, 1, 2, 3, & 4
Files, set
Furnace, heat treating
General hand tool sets (fencing)
Grinders, portable and pedestal
Hammers, set
Home plumbing hand tool sets
Hot metal hand tool set
Iron, soldering

I. A. Equipment (continued)

Jointer
Ladder, step
Masonry hand tool sets
Monitor, safety glasses
Painting & glazing tool set
Planer
Planes, hand
Pliers, sets
Punches, sets
Rules, sets
Saws, hand sets
Saws, metal power hack
Saws, band wood
Saws, portable circular saw
Saws, tilting arbor
Saws, hack hand
Screwdriver, sets
Set, handsaw
Small engine, tool sets
Soldering 7 sheet metal hand tool sets
Sprayer
Squares, set
Stamps, set
Tachometer
Tap & die set
Tool fitting hand tool sets
Torches, carbon arc
Tractor maintenance hand tool sets
Vises, wood, metal, and pipe
Welders, arc
Welders, oxygen-acetylene
Welders, spot
Welding, cylinder truck
Welding, accessories, sets
Welding booth
Woodworking hand tool sets
Workbenches, wood and metal
Wheelbarrow
Wrenches, sets including open end, box end, combination, socket, allen, adjustable, and pipe

I. B. Tools/Apparatus/Supplies

Awls
Battery service tools, set
Bob, plumb
Brushes, paint set
Cans, safety
Card file
Chains, towing
Dividers
Drain pan
Dresser, grinding wheel
Drills, hand
Edger, concrete
Extention cords
Flaring tool
Floats
Fire blankets
Funnels
Gloves, welders
Groover, concrete
Guns, grease
Hatchet
Hose, garden
Lights, timing and trouble
Magnet, pick up
Oilers
Pullers, gear and wheel
Rasps
Reamer
Respirators
Scissors
Scrapers
Shields, face
Shovels
Snips
Stencils, set
Stones, oil
Stripper, electric wire
Surform
Tester, anti-freeze and current
Thread, chaser, spark plug
Threader, pipe
Tongs

I. B. Tools/Apparatus/Supplies (continued)

Trowels
Tube bender
Tube cutter
Valve tool

C. Educational Media

Charts
Displays
Films
Filmstrips
Manuals
Models
Reference books (maximum 5 copies each)
Safety signs & tape
Specimens
Slide sets
Transparency sets

Good judgment should be used in making available a variety of up-to-date audiovisual materials in a quantity sufficient for the teacher to provide for individual needs in a competency-based system.

One copy of Agricultural Science and Mechanics I and II--A Curriculum Guide for Agricultural Education and Agricultural Production--A Curriculum Guide for Agricultural Education distributed by the Agricultural Education Service must be available to each teacher. Reference books or manuals pertaining to instruction in Agricultural Science and Mechanics and/or Agricultural Production must be available.

D. Instructional Supplies (examples of expendables)

Bolts, nuts, and washers
Acetylene gas
Electrodes
Welding rods
Oxygen

I. D. Instructional Supplies (examples of expendables) (continued)

Propane gas
Nails
Screws
Lumber
Bulbs
Seed
Fertilizer
Paper
Sandpaper
Paint
Varnish
Chalk
Tally sheets
Glues
Polish
Brushes
Tape
Tacks
Soil
Soil conditioners
Plants
Cleaning compounds
Solder
Metal
Pipe

II. Supplementary basic items of equipment, tools/apparatus/supplies, and educational media eligible for reimbursement.

A. Equipment

AVR Tester
Battery charger
Battery starter tester
Cleaner, steam or high pressure
Combination analyzer
Crane, portable hydraulic
Creeper
Current indicator
Dust collector system
Engraver, electric

II. A. Equipment (continued)

Engine analyzing equipment
Engine stands
Engines, small gasoline
Fume removal system
Greenhouse
Hoist
Ignition tester
Jack, hydraulic
Levels
Lathe, wood w/ tools & plates
Micrometers, set
Mixer, concrete
Parts, washer
Sander, portable
Saw, radial arm
Saws, chain
Shear, lever
Sprayers, paint
Simulator
Tractor w/ equipment
Truck
Welders, mig
Welders, tig

B. Tools/Apparatus/Supplies

1. Agricultural Engineering

Drawing board, basswood 17" x 22"
Drawing set
Scale (architect molded plastic)
Triangles 30° x 60°, 45°
Protractor
Triangle scale, 12"
Drawing compass
Surveying chain w/ reel
Surveying chain w/ out reel
Farm level, telescopic & tripod

II. B. 2. Agricultural Crops

Acid test kit
Soil test kit
Sieves for grading seed
9" x 9", set of 12
Soil auger, 40" long
Soil thermometer
Seed threader
Grain judging trays

3. Forestry

Auger, soil
Axe, bush
Axe, single bit
Axe, double bit
Bag, planting
Bars, planting
Borer, increment & case
Clinometer w/ case
Compass, hand
Compass, surveying & staff
Flagging, plastic
Grids, acreage
Goggles
Gauge, bark
Gauge, angle
Guards, shin
Gun, tree marking
Hammer, increment case
Helmets, head caps
Hook, cant
Injector, tree
Kit, soil test
Level, abney case
Level & stadia rod
Magnifier, pocket
Meter, tally
Paddles, tree marking
Peavy (solid socket)
Powder, tree marking
Prism, cruising
Reel & chain tape

II. B. 3. Forestry (continued)

Saw, chain
Rule, lumber
Saw, pole
Saw, pruning
Scale, tree & log
Seeder, cyclone
Shears, Christmas tree
Steroscope, pocket
Stick, biltmore
Tally boards
Tape, tree diameter
Tape, two chain
Tree marker, chalk

4. Horticulture (Ornamental)

Brooms, street
Dusters, knapsack
Edgers, lawn
Hoes
Knives
Rakes, lawn
Rakes, garden (steel)
Grass shears
Pruning shears
Nursery spades
Sprayer, knapsack, 3 gal.
Sprayer, hand
Spreader, lime
Wheelbarrows
Crowbar, combination 6'
Digger, post, long handle
Hoses, water 200 ft. 3/4"
Knives, budding No. 716
Shovels, rd. pt. L. H.
Shovels, sq. pt. L. H.
Shovels, rd. pt. S. H.
Shears, pruning S. N.
Shears, grass 6"
Shears, pruning L. H.
Snips, pruning
Saw, pruning 20"

II. B. 4. Horticulture (Ornamental) (continued)

Saw, L. H. 12"
Hedge clipper
Hedge clipper, electric 16"
Grass hooks
Mattocks
Picks
Forks, L. H.
Trowels, plant
Lattern (wax melter)
Tree trimmer 12'
Sprinkling cans, 2 gal.

5. Horticulture (Orchard & Garden)

Tree trimmer, 1-1/8" x 1-1/4" - 10
Pruning saw, tapered 14"
Pruning knife, 4"
Grafting wax, hand grafting wax (1 lb.)
Tree scraper
Fruit picker, metal frame, cloth bag
Fruit picking bag, heavy duck
Pruning shears, hand, 10"
Lopping shears, tree pruner
Budding knife, 4" beveled blade
Spray, garden
Duster, garden

6. Bees Production

Hive, standard or all
Supers, shallow
Cover, metal or wood
Queen, excluder, 3-wire standard
Bee escape, double
Hive base, cypress
Honey extractor (centrifugal)
Comb knife
Veil, clear vision
Smoker
Hive tool, steel, 8" or 10"
Foundation comb, 3-ply
Brood frame, wood or metal spaced

II. B. 6. Bees Production (continued)

Honey sections
Queen trap, wire
Inner cover, improved

7. Dairy Production

Milk pail, seamless small top
Milk strainer, seamless dome, cotton disk
Milk scales, 60 lb.
Pipe line scales
Milk bottle brush
Mastitis detector blotters
Mastitis test kit
Strip cup, tray type
Horn file, 10"
Horn scraper, removable blade, 10"
Anti-kickers, adjustable
Bull lead staff, 5'
Marking comb, steel
Milk fever outfit
Cleaning brush, cattle cleaning
Electric clippers
Babcock testers, & accessories
Whole milk test bottle, 18 gr., 6-1/2"
Skim milk test bottle, 6-1/2"
Cream test bottle 9 gr., 6-1/2"
Milk test pipette
Cream test pipette
Acid measure
Milk test bottle brush
Cream test bottle brush
Milk pipette brush
Bottle case, capacity 24 bottles
Thermometer, dairy, 8", 30-200° F.
Dividers
Test bottle bath & rack, 24 bottle-steel tank
Stone jar, 3 gal.

8. Livestock Production

Show halter, leather
Show stick, show lead

II. B. 8. Livestock Production (continued)

Burdizzo dehorner
Dehorner (a) convex, (b) barnes, (c) tube, (d) electric
Emasculators
Castrating knife
Elastrator
Metal syringe, 4 oz. long type, 3 ring
Balling gun
Set vaccinating instruments
Artery forceps
Capsule gun
Jaw spreader
Hand clippers, 11-1/2"
Ear marker, V-shaped
Hog rings and pincers
Pig teeth nippers, 6-1/2"
Trocar and canula, 5-1/2" metal handle
Horn weights, adjustable
Tattoo set
Branding sets
Livestock scale
Meat thermometer
Farrier equipment
Livestock chute
Electric groomer

9. Poultry Production

Egg scales
Egg candler, heavy leather, cushion at opening
Egg basket, wire
Fowl catcher, hook end 45"
Antigen test box
Poultry marker, tattoo 5-letter
Debeaker and wing clipper
Band applicator, metal
Time control
Chicken sticker

II. B. 9. Poultry Production (continued)

Caponizing set
Dissecting set
Vaccinator
Exhibition coops, wire 24" sp. double

10. Laboratory and Miscellaneous

Alcohol lamp, 8 oz., 1/4" wick
Household scales
Tripod magnifiers
First aid cabinet

11. Office and Classroom Equipment

Movie projector, 16 mm
Projection table
Filmstrip & record player combination
Slide and filmstrip projector
Slide projector
Screens
Overhead projectors
Copy machines for transparencies
Tables, 2 pupil
Chairs, pupil
Desk, teachers
Rack, magazines
Typewriter
4-drawer file
Map and chart file
Adding machine
Postage scale
Desk, secretary
Desk, office
Chairs
File basket
Duplicator, mimeograph
Recorder, tape
Recorder, video
Lettering equipment for signs

II. C. Educational Media

Disease specimens (plant)
Feed samples
Fertilizer samples
Films
Film strips
Grain samples
Insect specimens
Reference books (maximum 5)
Reference manuals
Record books
Safety signs
Slide sets
Transparency sets
Weed samples

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